NATURE MAGAZINE

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TO STIMULATE PUBLIC INTEREST IN NATURE
ANA
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SEPTEMBER · 1934

BEARS WILL BE BOYS
Wendell Chapman

THE HERMIT OF THE BEACH
Marion Staples Haller

"WINNIE", THE VINEGARROON
Guy Van Duyn

WHENCE THE FRUIT FLY
John G. Hope

RING-TAILED CATS
Agnes Akin Atkinson

HIKER AND CAMPER
Ernest A. Dench

NATURE MAGAZINE

PUBLISHED BY THE AMERICAN NATURE ASSOCIATION

To Stimulate Public Interest in Every Phase of Nature and the Out-Of-Doors, and Devoted to the Practical Conservation of the Great Natural Resources of America

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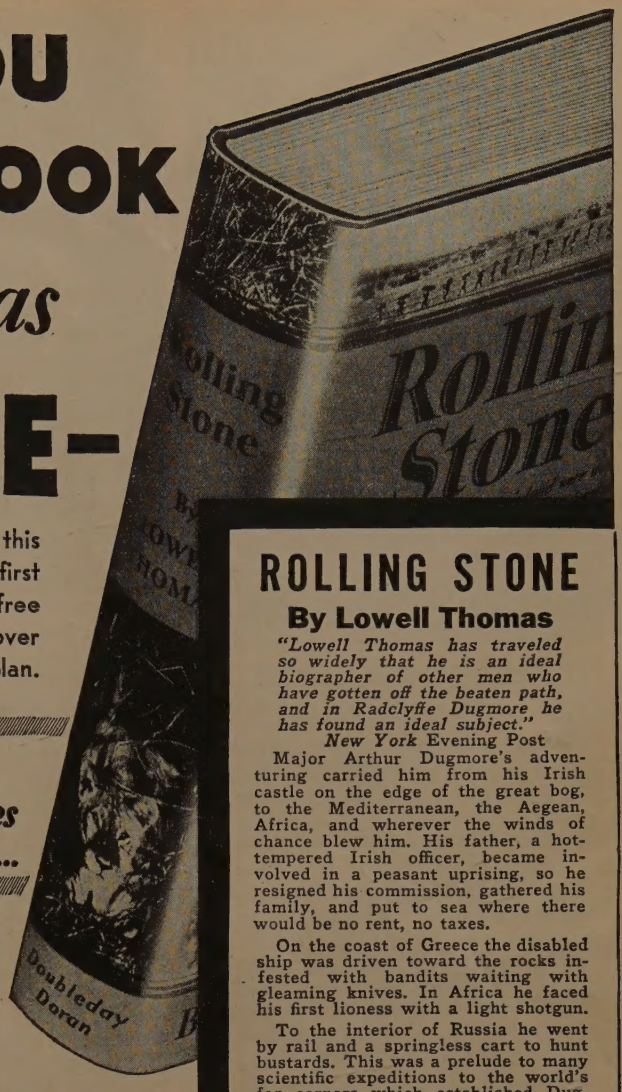

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LEFT TO RIGHT—THE CAMERA FOCUSED ON THE MANY SPINES OF THE UPPER SURFACE; THE ANIMAL PHOTOGRAPHED IN A NATURAL POSITION; A PURPLE STARFISH AGAINST A DARK BACKGROUND

ALONG THE SEASHORE

By Raymond A. Wohlrabe

One who wanders along the seashore without a camera misses the opportunity of getting many interesting pictures of marine animals.

Film that is very sensitive to light is not the kind I would recommend for use on photographic seashore hikes. Panchromatic film, though excellent for recording proper color value, is too easily fogged by light that unavoidably leaks into cut film magazines and roll film holders in places where light is very intense. On the seashore light comes not only from the sky but, with almost equal strength, from sand and rocks and the great reflecting surface of the sea itself. It is a place where the aid of color filters is an aid not to be scorned. A K2 filter is particularly welcome. Excellent pictures can be made however when filters are not used. Some of the new, fast films that producers have placed on the market are far superior to panchromatic film in this work of the amateur photographer.

To insure abundant rewards from your seashore excursions it is distinctly an advantage to make a study of the haunts of such animal folk as inhabit the narrow strip that lies between high tide mark and the low point which low tide reaches. Then no time is lost in finding them. No opportunities are missed. Have you ever, lying prone on the planks of a pier, looked down on those great plumed clusters of sea-anemones? Many of them, like huge flowers on long, thick stalks, grow near the surface where the light which has penetrated the water is strong enough to make photographing them no difficult matter. Have you ever looked in through the top of a tide pool with its small world of crabs and starfish and mollusks and sea plants? There lies a source of many pictures. Starfish are abundant on any ocean beach where clams or other mollusks are also plentiful. Such mollusks are their food. Sea cookies might be found in the vicinity of beaches frequented by starfish, although they usually prefer a beach that is smooth and sandy. The sea urchin, bristling with spines, inhabits the stretches of rocky tidelands usually exposed only at low tides. All make interesting camera studies. And if you have ever overturned rocks on any isolated beach you have witnessed the scramble of crabs, frothing in their anger at being so rudely molested, scuttling to the nearest crevice and sparring as they go. A host of armored creatures make rock crevices their home.

Starfish are an excellent example of beach life that is interesting and abundant and offers all of the peculiarities encountered in photographing any of the other forms of life left for our observation when the tide goes out. Let us consider them as illustration of the precautions to be taken in this field of Nature photography.

At low tide look among the seaweed floating in the pools left standing on the beach. Undoubtedly some starfish have been caught unawares while enjoying a meal of tasty mollusks. To see them eat is a sight worth hunting for. According to good starfish etiquette, it is not only proper to lift one's food to the mouth with the feet but also to throw one's stomach out through the mouth, wrap it around the food and proceed to digest it in public. On the under side of the starfish's rays are hundreds of glistening tubes each bearing a cup-like disc at the tip. Tube feet they are called. In the process of pulling the shells of a clam apart each tube foot does its bit. The pull is due to suction. The clam's strong muscles are far stronger than the pull of all the tube feet together. The starfish becomes the "big bad wolf of the sea" in this seashore episode—he pulls and he pulls until he pulls the clam's house apart. Under the tugging of hundreds of tube feet the clam's muscles grow tired and relax and the shells move

PICTURES TAKEN THROUGH WATER REQUIRE A LONGER EXPOSURE FOR THE SUBMERGED PARTS OF THE SUBJECT

A STARFISH USES ITS TUBE FEET TO RIGHT ITSELF. THIS PROCESS MAY BE CAUGHT BY THE QUICK CAMERA

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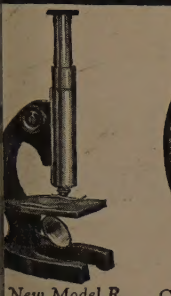

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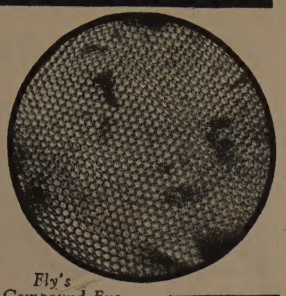

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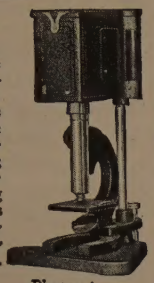

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apart. Then the starfish dines.

Careful focusing, careful consideration of the reflection of light from water surfaces, and, above all, the background are problems confronting the photographer who wishes to photograph such tide-flat episodes as this.

The light must be coming from some point over the shoulder. Then the angle of incidence will be such as to reflect any direct rays of light which might be reflected in a direction away from the camera's lens and not toward it. I have found also that if particularly clear pictures are desired, an improvised screen of some kind placed so that it shades from the sky the portion of the water through which the picture is to be taken, there is then no danger of reflections of the sky interfering with the clearness of the photograph. Such a sunshade might be a discarded umbrella, a blanket hung on sticks or pieces of driftwood, or something similar. With such a precaution there is little danger of dimming of detail. The stop used must be slightly smaller than is ordinarily used for taking landscapes under the same light conditions. If no such precaution is taken the stop should be quite small and the shutter speed slightly increased. The same result could be obtained, of course, by increasing the shutter speed considerably and leaving the stop about as it is. But the first method is always preferable. Cutting down the stop leads to greater sharpness of lines, clearness of detail. If the animals being photographed are much below the surface of the water, then the stop will of necessity be increased and the shutter speed decreased to insure ample time for the relatively dimly illuminated animal to be registered on the film.

In seashore Nature studies, since all of the animals which might be photographed are interesting because they are so different from land animals with which almost everyone is familiar, sharply focused detail is essential. To be sure that all parts of the animal are focused sharply it is best to have it well within the camera's field. Then choose some part of the animal's body and focus as sharply as possible upon it. In starfish, the tiny spines on the skin of the upper surface or the worm-like tube feet serve well for this purpose.

Background plays a large part, too. You know how crabs and sandworms and sand-dollars are often lost to the eye in the mottled background built of rocks and pebbles and bits of shell. Nature had a purpose in making her beach folk blend so well with their surroundings—that purpose was protection. But backgrounds built of pebbles are too much of a conglomeration of highlights and dark splotches to enhance the value of a photograph. Take your specimen to some rock crusted with barnacles and draped with ribbons of seaweed, transport it to a beach of smooth sand—by all means get it away from a mottled background if it is the picture of the animal itself that interests you!

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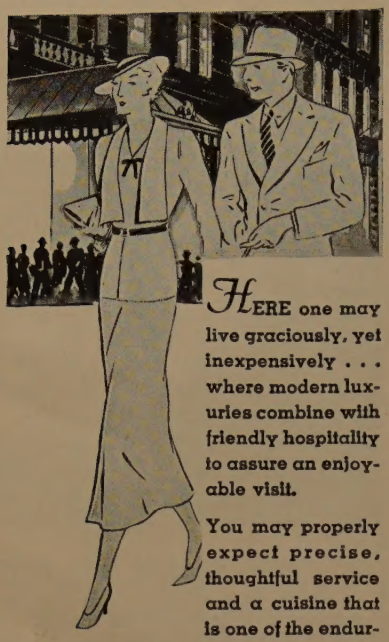

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WHAT IS A SANCTUARY?

We hear a great deal, these days, about wild life sanctuaries. We also hear such terms as game refuges, game preserves, game management, predatory animal control, game conservation, fish conservation, bird protection and so on. Whatever the popular misconception may be of the word "sanctuary" as applied to wild life, none of these terms is synonymous with sanctuary as it should be regarded. All of these terms reflect the economic viewpoint of our wild life resources—the viewpoint that holds that these resources should be managed, preserved, conserved or controlled in order that they may subsequently be killed.

Sanctuary is defined as a place of refuge or safety. This is a proper enough general definition, but when it is applied to wild life it is as full of exceptions as a colander is of holes. The man with the economic or hunter point of view will piously announce that such and such an area is being set aside as a wild life sanctuary. Close upon the heels of this announcement one is certain to learn that on the area a concerted campaign will be conducted to kill off all "vermin". This means foxes, skunks, red squirrels, weasels, muskrats, rabbits and other forms. It means the shooting of hawks and owls, regardless of their beneficial services in keeping other forms in balance.

In other words, it is not a sanctuary at all. It is a game breeding area. There is no safety or refuge there for many forms of wild life. Over it Nature must share control with Man, whose aim is to upset that very balance which Nature seeks to create. It is like giving over the joint management of a great bank to an experienced financier and a bandit.

If the hunting of game birds and mammals is to continue there must, to be sure, be game conservation, protection, and, probably, management. There must be, in fact, a great deal more of this than there is today or soon there will be nothing left to hunt. At the same time there is another considerable group of people entitled to consideration. It is that group whose interest in wild life is based upon educational, recreational or esthetic grounds. This interest embraces those forms now described by the hunter as predator and vermin. All wild life is the heritage of all our citizens, and not the special inheritance of those whose sole interest is to kill for sport.

There has been and still is an over-emphasis on the economic and sporting control. This is due, of course, to the greater degree of organization of these interests; to the large funds available by virtue of the selfish concerns of the manufacturers of arms and ammunition; to the greater noise made by this group in behalf of their desires. Because more pains are taken to emphasize the activities of the destroyers, the killers of wild creatures seem to put into circulation more money than do the non-killers. The result is a condition both dangerous to the future of our wild life resources and unfair to an important body of our citizens.

But it is significant that the Senate Committee on Wild Life, though it has done little to encourage legislation that is heartening to the non-killing, Nature-loving public, recognizes their contributions to American business. In its first report, published in 1931, the committee found that while game and game fish are steadily decreasing, hunters and fishermen, who spend annually fully three-quarters of a billion dollars, are increasing. But the report continues:

"These estimates concern only those values realized in the pursuit of wild birds, animals, and fishes for food and sport. By far the greater proportion of Americans who annually go afield to enjoy our wild life resources and the associations of out-of-doors do not either shoot game or catch fish for sport. But all of them, nevertheless, are interested in wild life. Their numbers are annually increasing.**** It is impossible to estimate, even approximately, the tremendous sums annually invested and spent by this vast group of recreationists who are attracted by the ennobling and inspirational qualities associated with all varieties of wild creatures and their environment, but when figures are compiled they will dwarf any totals so far presented in connection with the activities of fishermen and hunters."

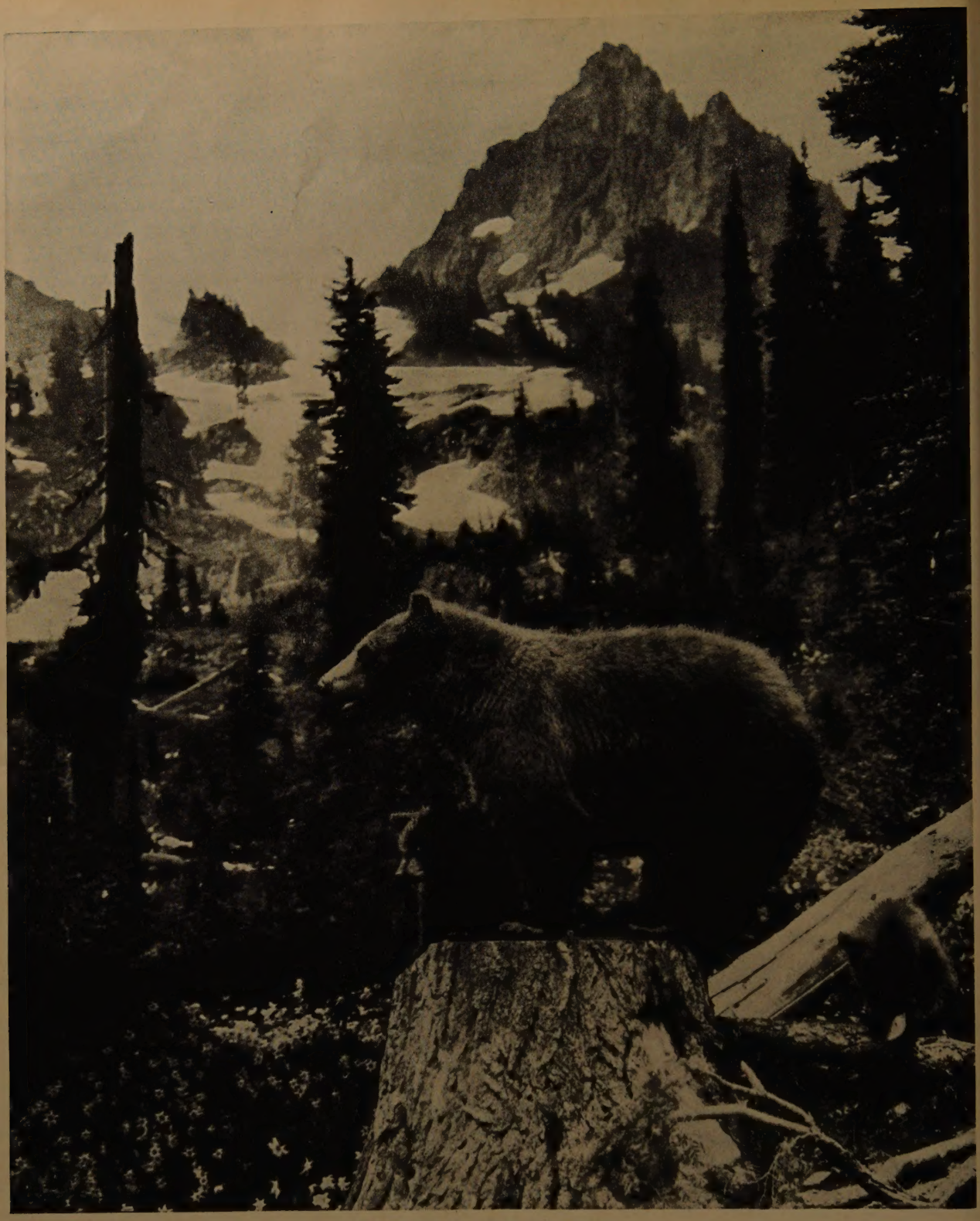
In Canada there seems to be growing a wiser and saner view of this situation than is held in this country. The Federation of Ontario Naturalists is an organization which has given much study to the existing problems and arrived at some eminently fair conclusions. On sanctuaries the Federation says:

"The need for Nature preservation does not depend only on the economic value of the natural life usually considered worthy of conservation. Few thoughtful persons would wish to have all wild places subdued, all swamps drained and all deserts irrigated, so that ultimately our country would be a series of vast cities and gardens, with no wild life except those forms that supply us with food, clothing, or sport.**** Few believe that the inspiration we derive from wild Nature are survivals from a more savage stage of existence and that the more highly socialized man of the future will gather more inspiration from the mad crush of home-bound street car crowd than he will from the solemn majesty of unspoiled Nature."

This is well-stated, and, although intended to refer to the Province of Ontario, is equally applicable to this country. And in defining what a sanctuary for wild life should be, the Federation declares that "a Nature sanctuary should be an area where Nature, not certain elements of it only, but *all* Nature, is sacred from interference."

Let that be a text kept always before those entrusted with the funds and programs of the moment for wild life sanctuaries. Let them keep always in mind that they are serving more than one interest and viewpoint. Let them come to regard the word inviolate as an essential adjective for use in connection with the word sanctuary. And let them mean it!

R. W. W.



BROWNIE AND HER TWO CUBS

Members of the brown bear family in Mount Rainier National Park.
In the background rises Pinnacle Peak of the Tatoosh Range

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THE CUB LOOKS ABOUT SEEMING TO BE YEARNING FOR ITS LOST BROTHER, VICTIM OF A TRAGEDY OF THE WILD

A FEW DAYS BEFORE A MALE BEAR HAD INTERRUPTED BROTHER AT MEALTIME AND SHAKEN HIM TO DEATH

© WENDELL CHAPMAN

Bears Will Be Boys

Mother Bear Does Not Believe in Sparing the Rod and Spoiling Her Cub Offspring

By WENDELL CHAPMAN

A BEAR mother, never having heard of modern psychology and ingrown egos, does not spare the rod in the upbringing of her cubs. She disciplines and teaches, combining negative as well as positive methods of child-training. Like boys, the cubs object to discipline, much as they need it, but seldom do they have their own way against a mother's will, try as they often do.

In one respect, however, a three hundred pound bear does not do so well by her cub. She brings him into the world weighing less than a pound. Without sight, hair, or teeth, he has to watch his calories closely in order to grow as large as an ordinary cat by the time his mother is ready to leave the den. By then he must have developed hard claws for climbing trees, and a coat which will keep him warm. When he leaves the den for his début, it is small wonder, then, that he appears to be mostly feet, mouth, ears and stomach.

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IT WAS SEVERAL DAYS BEFORE THE CUB GOT HIS NERVE BACK

He would spend all his time in trees peering down for danger and he found it difficult to get back his confidence in his mother after the tragedy

The scrawny offspring—one, two, or three—look incongruously small following the large mother in her shaggy coat. The cub's big mouth and tight pot-belly do great things during the summer, and by fall he is as large as a big dog, a matter which few dogs would care to stand up and dispute face to face.

The cub usually has a brother or sister, with whom he romps, boxes and quarrels in lusty disregard for the other fellow and an enthusiasm which would be disastrous to less sturdy infants.

The mother bear often curbs the waywardness of her naturally boisterous little imps. Although she will fight fiercely and give her life to defend her darlings from danger, sometimes those same darlings try the patience of a saint, and a she-bear has no claim to sainthood. The old adage, "Cross as a bear", has a definite basis in fact. Woe to the cub who incurs the maternal displeasure; he is likely to find himself pinwheeling down the pathway or through the grass. When the arm of the law strikes, he protectively curls into a ball and, while such form does not make for stability, it does decrease the resistance to the bumps and obstructions over which the disciplinary momentum is likely to carry him before he comes to rest where he can unroll, whine, and think matters over. When a mother bear swats her provoking brat, she ordinarily does so with such vigor that, as one old timer said, "It takes the little scalawag a while to get back into the family circle again." The robust chastisement by the mother has even given rise to stories accusing her of occasionally over-correcting her offspring and knocking one into Kingdom Come. However, such tragedies must be rare because a cub is built to withstand rough treatment and much of his learning has to come through his hide. Bad cubs who do not mind dread the punishment which comes after they have had their fun.

Twins who dwelt in the deep Yosemite canyon one day defied their mother's efforts to get them out of a tree top. They seemed to think that because they were as big as jack rabbits they need not submit to discipline any longer. When the mother told them to come, they sat looking down upon her with an air which plainly said, "Well, s'posen we don't. What are you going to do about it?"

The mother begged, she entreated, she beseeched them to come down from the tree. She wished to move on, but they refused to follow. When she called they looked wisely at each other, squirmed and snickered. Becoming impatient, she told them to come down or she would go up after them, and their answers were impudent, judging from the tone of their replies. Up the tree went the mother in a great huff. As she neared the top, her twin gifts from Heaven backed out on limbs so long that she could not reach them and so slender she did not dare place her weight upon them. As the cubs waved about on the swaying limbs, they looked at their mother, then at each other, and they sounded as if they were laughing at a good joke.

When the bear realized she stood no chance of reaching them she changed her grouchy grumblings into pleasant bear conversation. She began to talk nicely to them and sounded much like the boy who says, "Come kitty, nice kitty," as he tries to recover the cat to make her finish the fight with the dog. But the cubs were wise; they knew that they were in for it; that the old lady

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MOTHER BEAR AND A PAIR OF HER FURRY DARLINGS

Discipline is rough and to the point in the world of bears but the youngsters seem to thrive upon it and thus be strengthened for adult life

was only fooling when she talked nicely now. Consequently they sat pat—as pat as one can sit on a swaying limb.

The family difficulty arose about mid-afternoon. By nightfall, the cubs were still up the tree. The mother was sitting grouchily on the ground as if in futile meditation. When morning came, the tree sitters were going strong. The mother was still on the ground, her patience worn to a frazzle. By mid-morning the cubs were whimpering regretfully. They were hungry, yet they were taking no chances at the breast which was now nursing a good-sized wrath. In modulated tones they were throwing down peace proposals. To these the old bear broke out in raspy pop-offs of temper which made the cubs look at each other and wince. The hand that rocked the cradle was itching to perform a more violent service. No doubt about it. The volcano in fur continued all morning from the ground and from the tree, trying to persuade her twins to descend.

The hot sun poured into the treetop, wilting the cubs with thirst and fatigue and in this melancholy predicament they discovered a great natural law, "What goes up must come down", and accordingly surrendered. About noon time, as the truants descended, they raised their voices in the most mournful duet, knowing full well what was coming. They seemed to be aware of the fact that crying penitently sometimes softens a mother's heart. Could they have learned that watching campers' children?

The old bear backed away from the tree until they came to the ground, whereupon she let herself go and hopped into an infuriated game of bear bowling. The little fur-covered globes whizzed this way and that. Before they had time to unroll and squawk, the she-bear was upon them and with another biff sent them whirling away. After the punishment was finished the cubs unpossumed, with hides and bones entirely sound, to take a long delayed meal from a loving parent.

Bathing, what a nuisance *that* sometimes is! Cubs do not always like getting into the cold water which soaks through their fur and chills their tender hides. And often the water of a big river looks so threatening to a wee bear. But the mother insists that her urchins keep clean.

One spring day a mother bear spent most of the morning getting her three cubs to bathe in a swollen river. Evidently it was the cubs' first bath. The water curved against a meadow bank a foot high and swept in a steady current around the bend. Here the bear ambled off the bank, urging her children to follow. At the sight of their submerged parent pawing at the current, the triplets raised in rampant attention, looking at her in amazement, and then ran pell-mell for a tree. They had been taught, partly by Nature and partly by mother bear, to climb a tree when in doubt. Now they certainly were in doubt when their protector was swallowed almost out of sight by the inhospitable water. The mother, unable to call back her three delights, climbed out of the water and upon going to the foot of their tree, regathered the little Brownies. Again she led them to the river's edge and plunged in. Nervously the cubs paced the shore. The old bear reached her forepaws on the bank and lay floating at anchor, all the while imploring and coaxing.

© WENDELL CHAPMAN

THE STUBBORN CUB REFUSES TO BE INTRODUCED TO THE WATER
The mother argued, threatened and bullied but nothing would induce him to bathe until finally she cuffed him into the stream and dunked him well

Two cubs finally backed off the bank into the water and paddled around until the current whirled them down the curve. They made for shore and managed to reach the bank, the she-bear following solicitously behind and helping them out. Now the mother concentrated her attention on the third cub, who evidently preferred the French dry cleaning process to the hungry current. She pleaded with him for several minutes without results. She sat down, pursed her lips and whimpered nicely while he sat looking at his playmates rolling and boxing in the warm grass. She argued, she threatened, she bullied, but nothing could induce him to enter. Of course a modern mother versed in nursery psychology would have considered Junior something of a problem child, and would have allowed him to have his own way lest he become the victim of an inferiority complex, an inhibition, or some other dreadful anti-social kink. But the old bear had no fear of thwarting the development of Junior's personality. In fact he had too much already. No doubt, he inherited his cussedness from his father. Papa's little image was impervious to reason. He braced himself and howled to the sky in protest. At this outburst, the mother's patience crumpled and she gave little Stubborn a flip which landed him well out into the current. He came up all a'splutter, headed in savage desperation for the shore. Mother stepped down where he intended to disembark, leaned over the bank and, when her pride and joy came within reach, put her great front paw on the little duffer's head, dunking him up to her elbow with a shove which, in addition to bubbling him, pushed him farther from shore. Twice again as he neared the land the best friend he had in the whole world soused him under and tried to drown him, or so it seemed to him. Then the mother reached her broad paw down to help him up the bank; he crawled out dripping as in his own tears, yowling in a most dismal minor key. Once on land his sorrow dried even more rapidly than his fur, and with that quick shift characteristic of the emotions of childhood, he rejoined his playmates with cubbish joy.

Discipline is a serious matter in a cub's life. Of the many dangers with which he has to contend, one of the most serious comes from its own kind. A male bear will make short work of a cub if he has the opportunity. During the summer of 1933, a young mother with two small cubs had taken up the garbage can route in the camp grounds at Canyon, Yellowstone Park. Wandering from can to can, she upset the containers and pawed out the contents. The cubs scampered along, finding and quarreling over rare smellables. One day as the mother was leaving, a male bear approached the turned over can while one of the cubs was still in it. The male grabbed the trapped cub in his huge jaws and shook him like a dog with a rat. The mother, rushing furiously, made him drop the cub, but the superior size and strength of the male soon put her to flight. However, the brave attack gave the injured cub time to climb a tree and crawl out on a limb, from which he fell in a few moments, dead. Again the mother rushed at the male, who easily warded her off and sent her retreating up a tree.

Campers ran for the Rangers. The other cub, having climbed high, was out on a limb taking in the tragedy. When the first Ranger came running up the mother also was in a tree, the dead cub lying on the ground and the male bear at lunch near the garbage can. It is proverbially dangerous to be near when a cub is injured, because the mother is often erratic in picking the offender. Not thinking of the mother, the Ranger threw a rock at the male bear who started off on the run.

Suddenly a chorus of voices yelled, "Look Out!"

The Ranger whirled to face the mother charging with bristling hair, only a few feet away. Unable to get out of her way, the Ranger froze in helpless fright. A couple of jumps and the bear with mouth open was upon him. Then the unexpected happened. Instead of attacking the

ranger she swerved slightly, missing him by inches, and continued her furious charge. She was after the male bear! When the Ranger had thrown the rocks and started the murderer, the she-bear had rushed down the tree and taken up the chase. She recognized the Ranger as a comrade and was accepting his aid in chasing the criminal away. She closed in, getting the worst of it each time, and stalled until the Ranger caught up and started the old male again, whereupon she rushed in and snapped at the flying hind quarters until he turned on her once more. When the mother returned, the dead cub had been removed, and she had only the memory without the actual presence of his lifeless body.

What might have happened had she found her dead cub when she returned is indicated by the action of another mother whose only cub climbed a pole of a high voltage power line and was electrocuted. When it fell to the ground the mother rushed to it, examined in bewilderment the crisp form, pathetically turning it this way and that as she tried with her most loving intonations to call forth response. Tenderly she lifted it in her arms, hopefully caressing the fuzzy coat with her tongue. Finally she slumped down, clasped her cub gently to her breast and swayed back and forth, rocking it and crying a mournful dirge throughout the whole night. Had the mother never seen the electrocuted cub, the sorrow would not have gone so deeply. The removal by the Rangers of the murdered cub prevented the recurrence of this scene.

For several days after the murder, the surviving cub was all nerves. He spent most of his time in trees, peering down. If everything was quiet, he descended hesitantly to the ground and with forepaws firmly grasping the trunk, looked on both sides and all around. Frequently a slight noise or movement sent him scampering up again. If, upon his descent to the ground, all looked and sounded well, he picked out another tree nearby and ran to beat papa, not stopping until he had ascended several feet. His mother being near failed to calm him because he had seen how powerless she was against that big bear which had killed his brother. He had lost confidence in her, and when a cub loses confidence in his mother he is in a bad way, indeed. For nearly a week the grim game of tree-tag continued before the cub regained enough confidence to play about on the ground. He then looked constantly as if yearning for the lost brother with whom he had had so much pleasure playing and quarreling.

The rugged training of the cub helps prepare him for the sturdy vagabondage of later life. Even a yearling knows how to get results. Notwithstanding a bear's conceded sub-human mentality, again and again he outwits man. Although bruin's brain is not the equal of that of man in theory, his ingenuity in using what he has often gives him the edge over his superior in practice. A tourist who parked a sedan near a soda fountain in a National Park, leaving both front windows down and food on the front seat, found that out. A yearling cub, who was hanging around for just such openings, climbed in one of the windows and had settled down to a quiet meal when another park visitor informed the owner that a bear was in his car. At the astonishing news, the whole family rushed out, the father opening a front door and ordering bruin to depart. Disregarding explosive utterances and poised missiles, which could not be thrown into the car, the cub continued his meal. Much shooing and shouting ensued, whereupon the cub, with deliberate maneuvering, which gained for him time for several more gulps of cake, ambled out of the car. Rocks sent him scampering. A few moments later, as the family stood nearby in a huddle animatedly discussing the impertinence, a passerby called to them that a bear was in their car. They looked, and there was that same yearling sitting in the front seat finishing the lunch. The family had assumed that the incident was closed when the bear left the car. But he had ducked around the car and crawled in the window on the other side. Having been brought up to make his living off tourists, he had learned to take advantage of their psychological peculiarities. He knew the difference between man and bear. If a bear drives another away from food the usurper sits down to devour it and the jig is up, but if a man drives him away, the man does not usually eat the food, and there is hope.

These things he had learned as a cub. The rough treatment he had received at his mother's paw taught him to put up with the rocks and persist until he ended the job.

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Autumn with its riot of color is one of the most beautiful of seasons. But why do the colors of the leaves change? What alchemy is Nature performing? The answer to these questions is found in an entertaining article by Carol Woodward in the October issue. Do you grow lilies? Are you afraid to attempt some of the more exotic, fragile and apparently more difficult varieties? In an article on lilies in October, Allen Wood, Jr., shows us that the growing of lilies is by no means as much of a problem as many think. You will receive many suggestions of interesting varieties and hints on how to grow them from his article. Alfred M. Bailey of the Field Museum in Chicago contributes a fascinating story of shooting birds with a camera. Ingenious to a degree, Mr. Bailey has had some interesting and entertaining experiences in this work. And S. F. Aaron returns again to our pages next month with another of his fascinating insect articles.

TWO HERMIT CRABS PARTIALLY OUT OF THEIR SNAIL SHELLS

It's a well-named crustacean because it lives alone in a borrowed house for which it pays no rent and which it carries about with it for protection

THE HERMIT OF THE BEACH

How a crab has changed its form

By MARION STAPLES HALLER

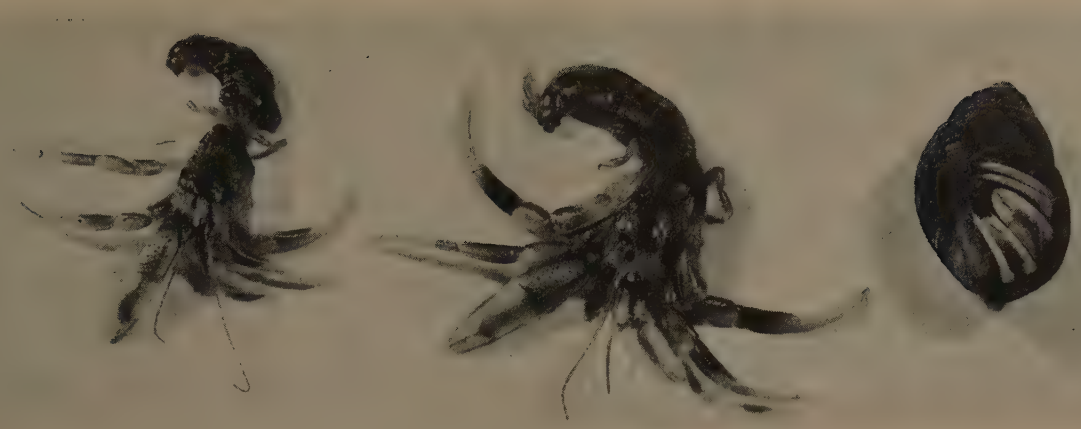
THE HERMIT CRAB, drollest shell dweller of the sea, was introduced to us dramatically by our six-year-old naturalist son. One day this summer, while vacationing on the southern shore of Cape Cod, we heard approaching the house an excited pattering of bare feet still wet from wading explorations, and presently we were invited joyously to peer into a miniature sand pail at "some speedy snails."

Our tolerant smile of disbelief changed to astonishment as we gazed at our small son's catch. In the bottom of the pail before us half a dozen snails, traditional symbols of slowness, were darting about in the water and colliding with such flashing speed that the eye could scarcely follow them.

A random grab into this maelstrom brought forth a coiled snail shell the size of a chestnut into which its dweller was retiring with frantic haste. A cluster of crab-like claws protruding from this coiled retreat was at least a clue and explanation for the nimble behavior of the snail shells, although this strange abode for a crab seemed unbelievable.

As we sat thus puzzling, six pink and white crustacean legs came warily forth from the opening in the shell before us. Two long feelers quivered apprehensively and then two beady, black eyes mounted on agile, long stalks peered forth, wagging up and down and sidewards like small periscopes sighting if the coast were clear. Apparently flight seemed the wisest course, for suddenly the shell went bumping off across the table, tumbled to the rug where it lay motionless a moment, then started on again, occasionally darting sidewise to avoid a chair or foot.

On dry land the crab was quite visible protruding from the erratically moving shell, whereas in the salt water the weight of the shell was lessened, so that the traveling crab was able to carry his home over his head, thus afford-



TWO OF THE HERMITS OUTSIDE THEIR SNAIL SHELL HOMES
Through a lifetime of living in these appropriated homes they have modified their forms and discarded and adapted parts of their anatomy to changed conditions

ing him greater protection from any enemies in the sea.

Was this shell produced by the crab himself, or had he moved into a deserted snail shell? Surely he seemed attached to his home, and was quite as adept in handling it as any snail.

No amount of coaxing or gentle tugging could persuade this wary crustacean to leave his ambush, so finally our curiosity, like Pandora's, led us to open the shell by carefully cracking it, dropping the crab into a shallow pan of salt water with a floor-covering of sand to approximate his natural habitat.

This funny creature was indeed a contradiction of armored, crustacean front and soft posterior covered only by a delicate skin. The continued habit of these crab species further to encase themselves with borrowed shells has profoundly modified the body structure. All the abdominal appendages are now reduced to mere vestiges, and the tail has become hook-like to allow the crab to anchor itself within the shell.

Not only have the appendages been modified to meet the requirements of shell life, but the body itself has become coiled to fit the windings of the shell. In all the specimens that came under observation, the abdomen coiled to the crab's right, as did the shells. Because of the greater weight always borne on the right side due to the shape of the shell, these crabs had developed larger right claws and legs, thus enabling them to maintain their balance in carrying a lopsided load.

What an irony of fate that these creatures, in their concerted effort to become more impregnable to their foes, should, through this very protection, develop a veritable Achilles Heel both vulnerable and hampering.

As soon as we dropped the "shucked" crab into the shallow pan of waiting water for convenient observation, he began a frenzied search for another shell. His desperate and futile efforts to hide himself reminded one amusingly of the traditional nightmare of finding oneself unclothed at a public gathering.

Now was our chance to see how the hermit crab went about house-hunting. We dropped a handful of snail shells into the pan, all but one of them filled with live snails. With renewed hope the crab sidled from shell to shell, turning it over and peering dejectedly at the closed snail door. Suddenly he whirled, struck out his strong right claw and caught an incautious snail by the feelers. The ensuing battle was gargantuan on a small scale, but came to a draw when the snail retreated minus a feeler, though still master of his shell. Undaunted, the crab went back to turning shells, and this time he was rewarded by finding a first class vacant apartment! Quick as a flash, he turned, back in, and hunched his new abode more comfortably on his shoulders, and once more looked on life with equanimity.

From observation of the community of hermit crabs adopted by us during our month at the shore, we discovered that, in common with other crustaceans, these crabs are scavengers. Also, they are inveterate fighters and will conquer and devour one another when opportunity offers. With the ridiculous solemnity of armored knights of old they joust and duel, withdraw and clash again.

Through diligent sleuthing in the library we were able to unearth the family history, skeletons and all, of the hermit crab. Three species of this crab are found in shallow water along our Atlantic Coast:

Eupagarus bernhardus, which is hairy and bright red in color, is common north of Cape Cod.

Eupagarus pollicaris, of which our pets were members, ranges from Cape Cod to Florida and is abundant on oyster beds and rocky bottoms of Long Island Sound. It is pink and white in color and the claws are granulated rather than hairy. This species inhabits the largest shells, usually of the whelk snail.

Eupagarus longicarpus is the most abundant and smallest of the hermit crabs, and lives in shallow water. Its yellowish-white legs streaked with dull green or blue distinguish it easily from the other two varieties.

In spite of the reputed abundance of the hermit crab, droll, shell-armored knight errant of the sea, we should never have had the pleasure of making his acquaintance had it not been for the sharp eyes and inquiring interest of an ardent and youthful naturalist. We have him to thank for sending us on the trail of hermit crab knowledge.

THE LITTLE RING-TAIL LISTENING AND ON THE ALERT

Bassariscus, it is called, and it belongs to the Raccoon Family. It is an attractive, nocturnal animal, normally dwelling in caves on cliffs in Mexico

OUR FRIEND, THE RING-TAIL

Wild Guests Who Pay Their Rent as Ratters

By AGNES AKIN ATKINSON

Photographs by Spencer R. Atkinson

We do not know when he came—nor why he came. But one evening we drove into our garage, and there he sat upon the rafters, looking down with his great big, round, appealing eyes.

We made him welcome by putting some cake and candy in a paper plate, and setting it up where the little ring-tailed cat had been. In the morning the food was gone. And he had brought another little ring-tail to share his new home. That year he and his beautiful little mate raised two baby ring-tails in the garage.

Every day the parents were fed. When the babies were big enough to run around on the rafters, and climb over the piled-up odds and ends, they, too, found plates of bread, milk, fruits, and sweets always waiting for them there in the garage.

The automobile was of unceasing interest to them. Almost any evening we can turn on the lights, sit inside the automobile and watch the two ring-tails inspect the garage and the car as though they were seeing them for the first time.

They showed by their actions that they knew we were there, and seemed pleased that we liked them well enough to sit very still and watch them at their play.

The ring-tailed cat, or Bassariscus, is related to the Raccoon family. Its buff-colored body with white underparts, is about the size of that of a small house cat. It has a fox-like head and ears, with big eyes which are as round as saucers.

His short, fat, weasel-like legs make him look as if he were sitting down when he is standing up. His little, fat, round feet are much like those of a house cat; the tracks quite similar, though smaller. Tucked away under the

soft balls of the little feet are sharp claws, which, when extended at will, enable them to climb the steepest sides of anything.

We have often seen them "scoot up" a two-inch galvanized awning pipe! As quick as that!

The strikingly long, squirrel-like ringed tail is both conspicuous and beautiful, and entitles the little animal to the name "Ring-tail." There are eight white rings and eight black rings on their tails, which are almost as large, and a few inches longer than the body.

These long tails act as a balance when the animals jump from rock to rock. We have often seen them leap ten feet and more, seemingly without any effort or reason, but only for the sheer joy of jumping. When frightened or disturbed a ring-tail can fluff out its handsome tail until it is bigger than its body.

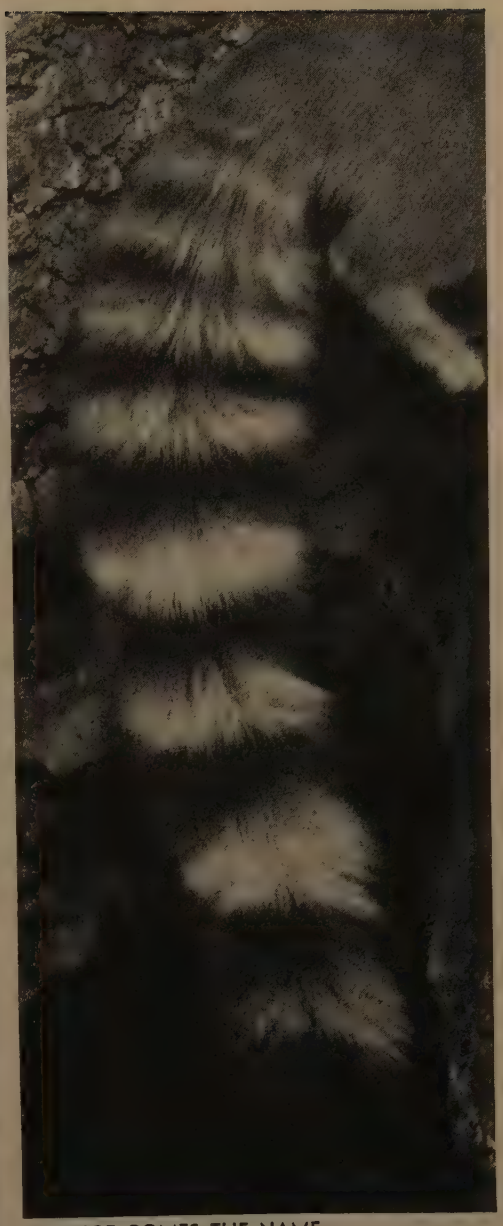
These small, wild creatures are cliff and cave dwellers, and have come into the Southwest from Mexico. There are several varieties that range the Pacific coast region and one extends into southern Oregon.

This past year the ring-tails found a small hole hidden away under the eaves of our house. And before we knew it, they had moved into the attic!

The sides of our stucco house make an ideal cliff, the attic a wonderful dark cave. So the ring-tails readily took up their abode in the warm darkness under our roof, and are still living there.

Every evening about six o'clock they can be heard in the attic getting ready to go on a nightly foray. They are strictly nocturnal in habit, although sometimes are seen about our home in the late afternoons.

Every morning, if one is not a sound sleeper, they can be heard just about daylight, coming back from their jaunts, and settling down for a day's sleep. Often we wonder whence their nightly journeys.



WHENCE COMES THE NAME OF RING-TAILED CAT

At the left the little animal takes a careful look about him before he ventures forth for a meal at the animal-feeding rock set up in the yard for various friends to enjoy

This year they raised two babies in the attic, but did not bring them down into the yard to the large flat rock which is our "wild animal feeding rock," until they were almost as large as their mother. Wherever the mother went, the babies were close behind her. They scooted around, in and out among the rocks of the loosely laid rock wall so quickly one could scarcely see them.

Later on we tried an experiment. The entrance to their "attic cave" home is just above the southeast window in our living room. At night we placed a plate with bits of cooked meat and pieces of cake outside on the garage roof that adjoined this window. Then we arranged a small desk lamp to light the plate.

The other lights in the living room were turned out, and we sat there and watched the ring-tails as they ate the easily earned tid-bits.

These little animals are excellent mousers and more than pay their rent by keeping rats and mice out of our home.

Later on, after the ring-tails were accustomed to the light on the food outside, we placed a table inside the room beneath the window which was left wide open. On the table was set a plate with scraps of cooked chicken, broken up pieces of chocolate cake—for which they had already shown a preference—and slices of bananas, to try to coax our attic dwellers into the living room.

After one or two nights of waiting, one little ring-tail came inside the living room and ate the food. Many nights we watched this beautiful little animal as it cautiously came in and ate its evening meal from the table.

He soon became so tame two or three people could stand or sit about two feet from him, without disturbing his peace of mind. We had the camera and flash-light set up to get a picture of our animal guest. When I looked at the picture, there was only my silver plate on the window, holding the food for the ring-tail.

From the tip of their little inquisitive noses to the end of their handsome ringed tails, the ring-tailed cat is a beautifully quaint little animal, and a delight and joy.

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THE TWO MOTHERLESS FAWNS WHO WERE RESCUED FROM THE WILD

At the right one of them tries out his none-too-certain underpinning. With a bottle diet and care they were soon a healthy pair of babies

Orphans *By* SIMEON OSTERMEIER

IN AN almost uninhabited section of southeastern Alaska, three of us were coming down through the rain-drenched forest to my cabin, one July evening. As we crossed a small area where the floor of the hemlock forest was clear of underbrush, we heard behind us several weak, high-pitched cries, really little more than long squeaks.

"Fawns," said Glen, as we stopped to look.

"Sounds like they are lost," I commented.

A moment later two small fawns came in sight up hill from us. Down the slope they made their uncertain way, dodging around boulders, stumbling over tree roots, and stopping frequently to cry. The three of us remained quiet. The fawns were almost at our feet before they noticed us. Then they seemed not to be surprised. From other encounters with very young fawns I have observed that they show no fear of man. One of these two came forward expectantly and nuzzled my hand while the other stood still regarding us. They were only a few days old. Both were pitifully thin, and their white-spotted buff coats were muddy and bedraggled.

"They're practically starved," said Glen. "I imagine a wolf or bear got the doe, and these little fellows happened to be cached in the bushes, and went unnoticed."

The area was full of wolves and black bear. At all seasons I have come upon the remains of a full-grown deer, sometimes surrounded by wolf tracks or bear tracks.

"Think they would live if we took them?" asked Glen.

"It's a sure thing they won't live long here by themselves," I replied. "It's a miracle that their cries haven't brought on a bear before this." I knew from my own experience that anything reasonably resembling a deer's call would attract any bear that heard it.

Then Glen recalled how his mother had once raised a fawn on condensed milk. So we took the ragged infants down to my cabin. We offered them ordinary canned milk, warm and diluted, in a bottle with a bit of rag tied around the mouth, nipple fashion. They took it greedily. The next day they appeared stronger. So, satisfied they would live, we decided to give them a good home. Tucking them inside our shirt fronts, we carried them several miles over the hills to a neighbor woman. They trusted themselves to her care readily.

When I saw them again several days later, they were flourishing. They were gentle as kittens, and, quite unmindful that this was a departure from the normal scheme for deer, were playing happily on the kitchen linoleum.

Toppy

By
ELEANOR WHERRIT
With Illustrations by the Author

TOPPY was a gift. When he was first offered to us, we said "no" most emphatically because he was such a scrawny, ill-fed looking creature. But we felt sorry for him and finally reluctantly said we would take him, with the reservation, however, that we would return him if he became a nuisance. We did not return him.

He is an Australian cockatiel; beautiful, high-spirited, impudent; coaxing for a fight one minute and begging for seeds the next; whistling to us when he gets lonely, and sulking when he doesn't get the attention he craves. He has a long, slender body, ashen gray in color, the shoulders and outer edges of the wings pure white. His head is yellow and on each cheek is a round spot of brilliant orange-red, and, on top of it all, a beautiful crest that moves up or down at will. An altogether lovable bird with a fascinating personality. His age is unknown to us —the donor had him five years, we have had him four; beyond that time his age, like the spinster's, is unknown.

His life, before coming to us, was an unhappy one. Because he had no way of making known his wants except by a shrill whistle and because his noise was annoying, his cage was sometimes put in a darkened room for days, or he was kicked at and poked at with a stick. Sometimes he had food and water, frequently he had neither. His owners were not maliciously cruel to him; they simply did not understand his nature. Perhaps their love for, and attention to, a parrot that had been in the family for years made them forgetful of Toppy. Whatever it may have been, he was ill-tempered, distrustful and vengeful, not at all a charming fellow when he came to us.

Since we have a deep-rooted antipathy to keeping anything in a cage, our first step was to make Toppy understand that we were friends, not enemies. Very gently, every day, the Doctor would put his hand into the cage, having first encased it in an old leather glove, and stroke Toppy wherever he could touch him, only to be met with a vicious jab from Toppy's beak. This treatment went on for weeks. Then one day the Doctor took Toppy out of the cage and held him in both hands. At first Toppy screamed and fought desperately to be set free but he soon tired and then lay quietly. This, too, was a daily procedure for weeks and many a time the Doctor has nursed sore hands, for Toppy's beak is like a strong pair of pincers and he drew blood often, even through the gloves.

At last Toppy seemed to sense that we would not harm him, and happy were we the day he sat on the Doctor's finger for the first time of his own free will, not attempting to fly away. From then on he became more and more amenable and it was with a little chirp of delight that he discovered his cage door open one day so that he could climb to the top of the cage and stretch his wings.

During this time we had his cage in the sunniest room upstairs, near a plant stand. I came in one day and found him sitting on the edge of one of the pots, eating the tender, young geranium leaves. From then on our geranium plants were soon stripped of their young leaves. His diet also included plenty of lettuce, green peppers, apples,

white grapes, a bit of pineapple and pounds and pounds of sunflower seeds. He ate in the daintiest manner and when offered a seed from our lips, would take it without touching us.

During the hot months, Toppy had the use of our screened porch, or his cage was hung on a tree in the shady part of the garden. There he would sit and scream defiance to all the birds who came near enough to hear him. I might add that he could make himself heard for several blocks, but he could also whistle for us the loveliest clear, bell-like notes or soft, low-throated tones which we loved to hear.

In the matter of cleanliness, Toppy was not so greatly to be admired for he did not want to take a bath. True, he preened and groomed his feathers many times a day but he paid not the slightest attention to a pan of water set near him, except to go wading in it. It was by chance that we discovered he liked a shower. The day had been dreadfully hot and we were out in the garden, Toppy in his accustomed place on the tree. He looked so hot and uncomfortable that we put his cage on the ground and very gently turned the fine spray from the hose on him. After his first gasp of surprise, he turned and twisted, lifting his wings, craning and stretching his neck, reveling in the feel of the drops as they sprayed him.

It was during one such occasion that we nearly lost him. The day was Sunday and we took Toppy out to give him a shower. The door of his cage was open and when the first drops fell on him, he stepped out of the cage and, with a shrill whistle, flew to the top of the tallest tree. This did not alarm us for the Doctor had carried him around the garden on his finger several times and Toppy had made no effort to fly away, but after calling to him again and again to come down, and his refusal to do so, the Doctor climbed the tree after him. Toppy waited until the Doctor reached out to take him in his hand—then he flew again.

Oh beautiful, beautiful, the flight of a bird, but when it was our Toppy—? Up, up he soared, his long, slender body cleaving the air without effort. How and where did he get the strength to make such a long flight after years of confinement in a cage? Did this first taste of real freedom send the blood coursing through his veins in a riotous flood, lending strength to his wings? Did thoughts of his early ancestry uphold him in his flight, urging him to return to the life he was meant to live? Who knows?

All afternoon Toppy led us on and on, always choosing the highest tree for his resting place. It was not until dusk, when Toppy began to be afraid, that the Doctor succeeded in capturing him, and it was a tired, hungry, penitent Toppy who chirped a sleepy "goodnight" to us from the top of his cage. Toppy, Toppy, you would not survive the hardships of this world for long without our help—else you would have had your freedom long ago. And does not your bird conscience prick you for having kept us from a picnic we had long anticipated attending?

Now it came to pass, as the Good Book says, that Toppy wanted a mate and he became so vociferous in his demand for one that it was almost impossible to live with him. We wanted to get a mate for him and the Doctor had had his eye on a lady cockatiel in a downtown store for a long time, but imported birds are expensive and twelve and a half dollars are—well, twelve and a half dollars, especially when the roof leaks and the furnace needs repairing. What to do? Each day his wails became louder and he refused to eat even his greatest delicacy, the geranium leaf.

One day we found him making love to his own image in a mirror. That was too much for the Doctor! The next day he came home with a small box which he set down very carefully in front of Toppy and lifted the lid. Out stepped a shy, frightened little gray miss for Toppy, looking very much like him except in the coloring of her head. She lacked the brilliant red and yellow of Toppy.

Inwardly I was as pleased as the Doctor, but one mustn't give even doctors too much leeway; so I frowned. Half apologetically, half triumphantly the Doctor said, "But I got her for ten dollars!"

It was love at first sight! Such preening and strutting; such cooing and murmuring; such tender love-making as went on the next few weeks! Toppy was nearly beside himself with pride and joy. He whistled to her in a dozen different ways. He urged her to eat his dainties. He groomed her and caressed her and when they went to sleep, her head was tucked under his chin. Now they have settled down to a happily married life and, we hope, to the rearing of a family. Life does not become too monotonous, you may be sure, for Mrs. Toppy keeps her husband interested (as all good wives should) by hiding from him in some corner of the basement, and Toppy reprimands her occasionally by a not too gentle peck on the head when she gets too frivolous—which is also as it should be.

Needless to say, we are fond of our beautiful pair and Toppy's cheery good morning whistle to us is recompense enough for the long weeks of training and trouble.

THE ADULT FRUIT FLY MUCH ENLARGED AND THE PICTURE DRAWN OVER A PHOTOGRAPH MADE BY THE AUTHOR

UNDER THE LENS OF THE MICROSCOPE THIS INSECT IS A REAL BEAUTY WITH ENORMOUS RUBY-RED EYES

Meet Drosophila

In other words, consider the fruit fly, one of Nature's insect marvels

By JOHN G. HOPE
of the Wagner Free Institute of Science

DROSOPHILA is the scientific name applied by entomologists to an enigma of the insect world known by everyone. Familiarly he is known as "fruit-fly" or "vinegar-fly", terms happily bestowed because of his habits.

Many have wondered at the mystery of Drosophila—the mystery of "whence." On the kitchen table is a fruit dish, apparently devoid of insect life. The room is duly fortified by screens against insect invasion. But suddenly, one day, you are greeted by a swarm of hovering fruit flies. Certainly such a phenomenon must have caused the belief of many of the unwary in spontaneous generation.

However it is not necessary to resort to such a theory to explain the seemingly impossible. Drosophila's forebears were strictly dwellers of the tropics. The fruit vessels must answer for his present wide distribution over the United States. In much the same manner they are carried by fruit trucks from orchard to mart. The eggs may be laid on fruit which is only slightly broken, and in this cloak of invisibility Drosophila easily passes your battlements to the fruit compote. The fly rapidly matures and suddenly you are greeted by the swarm at which you wonder. The eggs and maggots being so tiny, they are virtually invisible. As for your screens, Drosophila may be heard to cry "A fig for them"!—A legion of these tiny mites could find entrée through one small opening.

A real beauty is Drosophila, though being such a tiny atom it is hard to see him well enough to appreciate his charms. Perhaps his enormous eyes, of a beautiful ruby red color, impress the casual observer most. Even in flight these brilliant orbs may be plainly seen, and serve to distinguish him from a host of other midges and gnats. Examined under a magnifier of even moderate power, Drosophila's other charms are brought to light. His soft parts are encased in a corselet of chitin, a horny substance which seems to be strong even in an insect so small. The abdomen is light in color, tipped with jet black in the male, while the female sports a pattern of transverse bars. The head consists mostly of the large eyes. Under the glass these are seen to consist of many facets, resembling a honey-comb, with bristles protruding from between the facets. On top of the head, between the eyes, are found the antennae, small feathery organs, of exceeding importance to the well-being of the fly. On the whole Drosophila imparts the impression of being vigorous and alert.

An empty pickle jar, amply supplied with mashed banana, is considered by Drosophila to be the very thing as an apartment, and if such a jar is placed in the neighborhood of a fruit dish it will soon be tenanted to the entire satisfaction of both the flies and the person endeavoring to study them. Endowed with several such jars and an unlimited supply of patience, the interesting goings-on of their tiny world may be observed.

Love makes the world go round, and even in the tiny

sphere of Drosophila everything centers on the perpetuation of the race. That such tiny specks of life should have a well-defined courtship is amazing, but by patient observation, one is sometimes rewarded by a fleeting glimpse of their love-making. Always alert, when the establishing of the next generation is the business on hand, the flies seem more excited than ever. The male trembles and sways on his thin legs, until spying a female he rushes madly at her. It is clearly a case of love at first sight. Coming before the female he raises his wings and vibrates them rapidly, quivering with excitement all the while. Perhaps at some imperceptible sign from her he rushes behind her and they embrace. At times the ardent swain caresses his lady with his tongue, but at other times this is omitted.

Occasionally I have seen the nuptials of a pair brazenly interrupted by another female. Rudely intruding, she would push the male with her legs, and in response to this kicking, he, fickle creature, would all too often leave his first betrothed for this "other woman".

The females begin to deposit their eggs after twenty-four hours and continue to do so for some days. The eggs are white in color and measure about .6 mm. in length. This is about the size of a pin point. They bear two long filaments at the front or anterior end. When the egg is deposited it is pushed into the soft fruit pulp posterior end first. The two filaments spread and rest on the surface of the pulp, thus preventing the egg from sinking in and suffocating.

THE LARVA

This is, of course, much enlarged. It is, when first born, only about 1.2 mm. in length and spends its life eating

After one or more days the larva emerges. It is a typical maggot and measures, when first born, 1.2 mm. in length. Its smooth round body is white or cream in color and is legless, but each segment bears a circlet of tiny spines. Locomotion is effected by an extension of the anterior or head end of the animal, which is accompanied by a strong contraction of the body. Then, while the spines hold the animal in place, the posterior end is drawn up.

The head end of the larva is merely a pointed segment which serves as a collar for a most astounding mechanism. Although as is usual with insect infants its sole purpose in life is to eat, the baby Drosophila does not possess a mouth in the true sense of the word. Eating is accomplished by the aforementioned mechanism known as the pseudo-maxillary apparatus. This resembles nothing so closely as a plough armed at the front with a pair of deflected falcate processes, sharp at the point, which work up and down constantly while at the same time the apparatus moves forward and backward.

THE PUPA OF DROSOPHILA

Within this case a miracle takes place and finally, from this prison, emerges another fly ready for a banquet and marital bliss

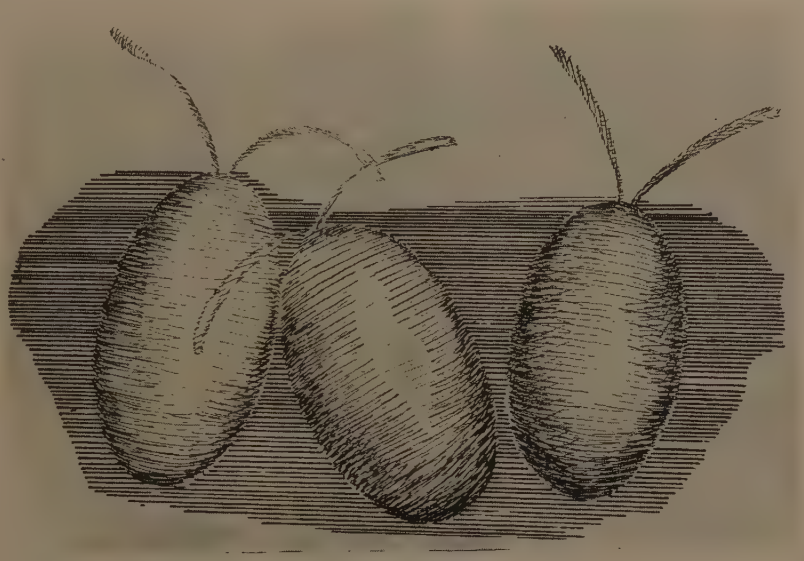
The motion of this peculiar apparatus seems never to stop. It is admirably adapted to the work of rasping up the micro-organisms on which the infant Drosophila feeds. It is also very probable that this apparatus is an appreciable aid to locomotion.

On the second day of its life the infant has grown to a length of 1.8 to 2 mm. On the first day it confined its movements to crawling over the surface of the fruit pulp, but now it starts to work in a vertical position. Head down, the lusty youngster plunges into the banquet. Projecting from his posterior end may be seen the ends of two tiny tubes. These are the spiracles, through which the maggot breathes. Their position is another example of the wonderful adaptation of organs to the environment

of the organism. While plunged to the hilt in his porridge, the maggot must breathe. This, however, is easily accomplished by keeping the tips of his spiracles above the surface of the fruit pulp.

Until it is full grown (in about ten days), the baby Drosophila does nothing but eat. When it grows too large for its skin, the skin is moulted. Freed of the confines of clothing too small, the maggot eats with renewed energy. There are several moults in the course of its existence as a maggot, although the exact number varies.

After a period of approximately ten days the now large, fat maggot is curiously assailed by the wanderlust. It has taken a fancy to traveling and wanders restlessly up the side of the jar which is its home. At last finding a suitable spot it passes into that state which is the miracle of miracles—pupation. I have not been able to observe a maggot actually transform into a pupa, but we can guess pretty closely as to just what happens by observing the result, and by comparison with forms whose pupation has been studied.



EGGS OF DROSOPHILA, HIGHLY MAGNIFIED

The filaments of the eggs, which are themselves about the size of a pin point, spread on the surface of the fruit pulp and keep the eggs from sinking in and suffocating

The maggot, having found a suitable place, must first of all cement himself securely to the wall of the jar with some secretion of his own. He then falls into a state of torpor. Gradually the skin becomes hard, brown and leathery, and then Nature in the form of an alchemist steps in. In the alembic of this hard skin, much of the living material is dissolved, with the exception of certain undifferentiated primitive cells in which remains the spark of life. Everything else becomes a fluid, but a fluid in which is retained the nucleus of the perfect adult. The fact of dissolution may be proved by puncturing the pupa with the point of a needle, for the contents will run out in liquid form. But slowly and surely the essential cells are rearranged to form the fly. A few hours before the emergence of the adult from its "mummy case" the red eyes may be seen through the pupal skin.

But how is this frail, newly-moulded creature to escape from its prison? There is no doorway through which it may step—and its mouth parts, though admirably adapted for ingesting fruit pulp certainly are not tools for opening such a vault. In Drosophila, as in other flies, the puparium is opened by means of the "ptilinum", a bladder-like structure emanating from a suture in the fly's head. The pulsation of this thin bubble forces off the head end of the puparium leaving a large opening through which the fly emerges. After emergence the wings expand and dry and the new Drosophila, spic and span, is ready for the banquet table and a little later for marital bliss.

The close association of Drosophila with fruit has naturally lead people to believe that they feed on the fruit. However the fruit itself forms a very slight part of the fly's diet. Percy Baumberger, working in the Bussey Institute at Harvard in a series of very beautiful and complete experiments, has demonstrated the true rôle of the fruit pulp in Drosophila's diet. Without knowledge of his work I carried out a series of similar experiments which led to much the same results.

Like humans, even these tiny creatures must have a balanced diet and nitrogen forms an important part of it. Now nitrogen is difficult for the insect to obtain. The fruits are rich in sugary substances but deficient in proteins. However, the yeasts which are the active agents in the fermentation of fruits are high in nitrogen content and are easily digested. Here then is the answer to the balanced-diet problem for Drosophila. Other micro-organisms than yeast are often found in fermenting fruit. Chief among these are the various moulds. However, these do not form an important part of the insect's diet. If the mould culture is not too heavy when the maggots are born, they soon disappear, having been destroyed by the young Drosophilas. On the other hand, in a heavy culture of moulds the young maggots soon die. The yeasts, then, are the most essential part of Drosophila's diet.

Some observant persons of a philosophical turn of mind have wondered how these flies find the fruit. It has been clearly proven to be due to the fly's sense of smell. The olfactory sense has been found to have residence in the tips of the antennae. Fruit in fermenting develops distinctive odors familiar and dear to the ardent wine maker—due to the various alcohols, aldehydes, and acetic acid produced. These odors possess great attraction for Drosophila, although merely as an olfactory guide-post to the necessary fermenting fruit. The maggots must have yeasts to feed on, therefore the eggs must be laid in fermenting fruit, and the peculiar odors due to fermentation act as a sign board showing the adult fly precisely where such an eating place may be found.

This may easily be tested by placing a small dish of alcohol or formaldehyde on a table and observing some flies which have been liberated in the same room. They will fly in wide circles around the dish. When close to the dish of course the stimulation is much stronger than when they are further away. In this way the circles gradually narrow down until the dish is found.

If the tips of the antennae are removed, no response is evoked, and the fly is unable to find the dish except by chance. This then solves the mystery of how Drosophila finds the fruit.

If Drosophila feeds on the yeasts he also helps them —racially speaking—by spreading them through the fruit. Also the yeast plants are carried about on his body hairs and in his digestive tract thus helping to infect new fruit. Thus the flies live where the yeasts abound to their mutual advantage, and in scientific jargon a loose symbiosis may be said to occur.

This then ends my observations of Drosophila. The few facts here portrayed are only a surface-skimming of the many secrets held by one of Nature's children. However, all the knowledge we have and all we can hope to acquire is only a slow accumulation of such facts by many workers. If you are seeking an interesting avocation why not become a sleuth on the trail of these very elusive mysteries? The clues are few and far between, but the facts gleaned amply repay for the hours of patient observation. This is true of many of the insects and other forms.

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A Carolina Wren Home

By GRACE WHEAT

WRENS have a habit of nesting in peculiar places and this one was no exception. Needing a piece of tin for our outdoor fireplace, I investigated a would-be junk pile. A rusty, gallon-size fly-dope can might have served, but on picking it up a commotion inside brought visions of a snake. I dropped the can and out fluttered a flustered, bewildered Carolina wren. Not stopping to view the catastrophe she went in search of her mate to relate the fearful tale to him. She must have experienced the same sensations humans do when a cyclone moves a house.

There! I had blundered and spoiled, as I thought, the cutest bird home—it even had a French window and storm-door entrance. White eggs with brown specks were scattered around the interior, so handling the can carefully I exposed one side with the can opener, permitting three eggs to be spooned out; one was cracked, one rolled back into the nest where there were three others, making six whole eggs out of the original clutch of seven. I closed the opening, replaced the can and withdrew to watch.

At once Madam returned to view the damage, coming out after several seconds to begin an outside inspection. She went over every inch of the roof, lighted on a squashed-down can in her dooryard, peeking and squinting. She flew away, returned, made further investigations, peeked in through the door, criticized the repair job, noted the French window in front, finally entering by that way. After the camera was erected with string attached and myself at a safe distance, both birds came. She carried a worm, an odd thing to do under the circumstances unless it was her way of showing nervousness.

I feared the eggs might have addled during such a violent shaking and she would give up the home. But not so! Madam Wren became so tame that knocking at her door did not make her leave until the can was raised off the ground. One end of the rusty home was filled with sticks holding a soft nest of feathers and moss in their midst. The can was within thirty feet of a highway where children travelled daily and when it came time for the young their teasing would give away the location, so Mother covered the exposed can with leafy brush. The sun made the tin so hot we do not see how the faithful mother withstood the heat inside. But the little wren family was reared, minus one member.

The Life of a Shrimp

By DR. ULRIC DAHLGREN

Most human beings understand the life histories of some of the familiar animals about them, mostly mammals that have become useful or pleasant to man, or invertebrate animals that we can use to advantage such as the honey bee and the silk worm. A large number of animals that injure us or our possessions have also been studied, mainly by those who have been hurt by them or are liable to be injured. Among such may be classed the lion, and tiger, and wolf. Still other living organisms have hurt us in many different ways and we have not even known of the injury or its cause, in many cases, until some scientist has told us about it, whereupon we have hired these scientists to learn all about these lowly animal or plant creatures in order that, knowing their life histories, we may be able to combat them. But such studies are often only incomplete or superficial.

One June day a long trawl line supporting many hundred hooks baited with bits of herring was being hauled up from the bottom of the waters of Frenchman's Bay. Some hooks had fish on them—skates, hake, flounders—others had the untouched bait and as this came into view from the depths it was followed by several dozen semi-transparent shrimps about an inch long. They played about the line and only left as it rose out of the water, when they swam down out of sight. Some were caught and proved to be a well known kind, *Meganyctiphanes norvegica.* It belongs to a group of lower shrimps, the fairy shrimps or *Euphasid* shrimps, and one of its prominent features that puzzled zoologists for a long time is a series of round organs that look like little eyes, placed at the bases of the legs, on the under side of the thorax. The shrimp has two large perfectly formed eyes on stalks just like any other crustacean and these little eye-like organs were called "accessory eyes" by the students of the group including the prominent Norwegian naturalist, Sars, who described it.

These organs were studied later by others and it was found that they were not eyes, or organs to take the light in and form a picture in the brain, but the opposite of this, organs to make or release light and throw it out. The tissue cells produce the light, just as a firefly light organ does, and the series of lenses and other structures focus it and throw it outward.

Early the next morning a trip was made on the bay and it was found that great schools of these shrimps were swimming on the surface, remaining but a short time after the sun rose. From earliest dawn until sunrise each swarm of shrimps was followed by a flock of gulls which preyed on them, fluttering and screaming above them as long as they remained in sight near the surface, dipping and diving as they caught and ate them.

When unduly disturbed after capture the tiny animals set all their lamps to glowing, giving off a bright greenish light that illuminated the pail or vessel in which they swam for a few moments after the disturbance. Unless the animals became excited by striking another individual or some foreign object when swimming in the sea, the light organs were not active.

These shrimps live in the cooler waters of the north Atlantic Ocean, confining their habitat to such waters as are found over the continental shelf and occasionally coming into the larger gulfs and bays. They do not live on the bottom nor do they have any connection with it for either feeding or breeding purposes. Still, they stay within a reasonable distance of the coast, swimming and hovering in the water and, with a few exceptions, never appearing at the surface except at night. One exception to this is in and around the entrance to Passamoquoddy Bay, a region of deeper waters and strong currents where the shrimp may be seen on the surface during July and August, swimming in large numbers near shore. Their favorite locality, however, is usually a few miles off the coast in water one or two hundred feet deep, from which depth they often come up to the surface at night. They capture small floating organisms for food but, as already shown they are sometimes attracted by dead fish, flesh or other bait.

In breeding they cast their eggs loose into the water and do not brood them as so many other shrimp-like crustaceans do. The eggs float about and hatch minute larvae which do not look very much like their parents. They rapidly go through molts of their shells each time looking more and more like the adult shrimp and each

time growing a little in size until after twenty-six molts they are fully developed members of their species. The light organs are not present until after the sixteenth molt.

Meganyctiphanes is only one species of a large family of similar shrimps that live in the ocean. The others, more than forty species in number, live a similar life in many seas. To the average observer, they all closely resemble *Meganyctiphanes*. Three or four of these kinds are sometimes to be found in company with *Meganyctiphanes*. They all have light organs, differing in number and detail from that of our subject. The one feature that most distinguishes them, however, is the fact that they all are inhabitants of the open sea and do not usually go as near to land as *Meganyctiphanes*. Some kinds are distinctly warm water forms and would die in the gulf of Maine at any season. *Meganyctiphanes* loves cold water and is abundant around Newfoundland, but seldom goes south of Cape Cod except in winter. Wherever it moves it goes in schools whose members are usually somewhat scattered but are sometimes close together. One cannot tell at what point the tow net may bring up great numbers. They have seasons of abundance when the whole gulf is full of them and seasons of scarcity when only a few are present in the school. This is determined by their food which consists mainly of smaller pelagic plants and occasionally some small animals.

Their method of feeding has been described by Dr. Marie V. Lebour at the Marine Laboratory at Plymouth, England. They have, like most of the larger crustacea, two principal kinds of legs on their body; an anterior set on the thorax and a posterior set on the abdomen. Those on the abdomen, as in the true shrimp, are used for swimming purposes. But whereas the thoracic legs of the higher crustacea are usually used for walking or grasping, in *Meganyctiphanes* and the allied species these thoracic legs are not fitted for walking but are long and brush-like, armed with fine hairs and can be curved and spread out with their tips pointing together so as to form a sort of basket.

When placed in this position currents of water are driven forward into this basket by the swimming motions of the abdominal legs and the many small microscopic plants, diatoms and a few small animals are caught in the basket. Our fairy shrimp now has its arms (thoracic legs) full of a large load of eatables, held in a position where its jaws can select what it wishes to eat. As it never rests on the bottom but is always swimming, it does not use its thoracic legs for any other purpose than holding its food. Sometimes it gathers and eats its own eggs and young in this way, though the large bulk of its food is vegetable.

But in marine life the eater is often eaten! *Meganyctiphanes* is no exception; he is one of the prime examples and serves as food for many whales, some sharks and many bony fishes.

The huge bone whales slide through the water with mouth open, allowing the current to run in the front of the mouth and sift out at the sides through the fringes of whale-bone. Here the shrimps collect and are swallowed at intervals until a meal has been attained. Such a meal consists of from 300 to 1200 quarts of these shrimps together with a few smaller crustacea and some jelly-fish and other forms scattered in it. When fish such as herring are present some of the whales eat them also, but these shrimps are their main dependence as food. The whales that eat thus on our Atlantic coast are the finback whale, the hump-back whale, the blue or sulphur bottom whale, the north Atlantic right whale and the pollock whale, although the latter eats the smaller crustaceans also.

As to fish, the pollock, the hake and the herring feed extensively on *Meganyctiphanes* and its cousins. A large pollock's stomach will often be found to contain a solid mass of them packed closely together. Bigelow has noted the abundance of these shrimps in terms of the number that may be said to exist beneath each square meter of surface in any given locality. One of the numbers so noted on one occasion is 275, which does not seem to be a very large number for a column of water one meter square and reaching from top to bottom in an average depth such as is found in the gulf of Maine. But let us figure a little! A square mile contains roughly 2,588,881 square meters. So under every square mile we would find 711,942,275 *Meganyctiphanes* and the gulf of Maine contains many square miles. Suppose we estimate that a square of 100 miles (much less than the gulf's area) shows this abundance of our shrimp. Then we would estimate that 71,194,227,500 of these animals were swimming around in this body of water. Quite enough to feed a number of whales and fish and leave many over to breed. And including his cousins, the other *Euphasid* shrimps, you could multiply the above number many times.

Whenever I stand on the shore and watch the sea heaving for miles before me I think of the vast population of these shrimps that surely are floating and swimming beneath its surface. When you cross the Atlantic in a comfortable steamer think of the millions of these delicate little animals only about an inch long that are swimming beneath the steamer's keel both night and day! This is true in any sea you sail on, cold or warm. You would find one or more kinds of *Euphasid* shrimps in one region and a different assortment in another. *Meganyctiphanes* would be among them for a day or two after you left New York bound east and again for a day or two before you reached English or French shores.

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Charles Fitzhugh Talman, noted weather authority, has written about Spring and Summer, and the facts and fallacies about these seasons, in earlier issues of Nature Magazine this year. In the October issue Mr. Talman tells about Autumn and the whys and wherefores of that season.

Calypso, Siren of Boreal Swamps

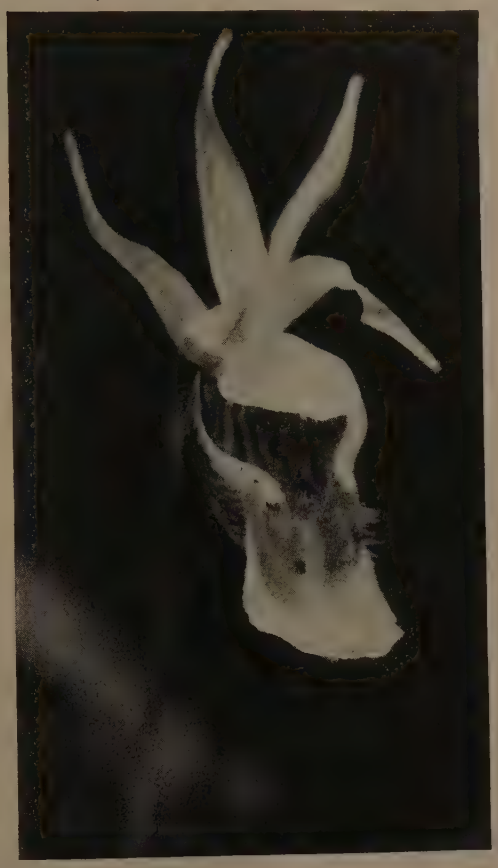
By MARY CARPENTER KELLEY

Photographs by Thomas W. Wallace

CALYPSO, bewitching queen of the Ogygian Island, was not more beautiful and alluring than her namesake, *Calypso borealis* (or *bulbosa*), that exquisite orchid of the cold, boggy swamps of northern United States and Canada. Nor was she more enticing, for although through her blandishments she kept Odysseus seven years on her island, *Calypso bulbosa* keeps forever the minds and hearts of those who have once gazed upon her radiant beauty.

He who has been lured northward into cold cedar swamps through whose icy waters he has plunged in rubber-boots to the spongy, moss-carpeted aisles of hemlock and tamarack forests, by the rumor of *Calypso's* rare loveliness, becomes her captive the instant he glimpses her pure, ethereal face.

He finds her standing only six inches high on a mound of soft, cold moss, perhaps surrounded by a pool of water on which the ice has not yet wholly melted, lifting her beautiful head to the sunlight that sifts down through the cedars and tamaracks. She wears a coronet of five nodding, rosy-purple plumes, three of which stand upright while the other two curve gracefully over her white forehead. Her throat is marked with stripes and dots in shades of pink and violet and cinnamon brown and she wears a fuzzy clasp of gold.



CALYPSO HERSELF
The ethereal bloom of the rare orchid whose spell is like that of the queen whose name it bears

At her side stands a single henchman, an ovate leaf of delicate plaited green. Her jointed scape and solitary leaf spring from a tiny, hard white bulb buried in the moss. Brave and beautiful beyond words is *Calypso,* the embodiment of the spirit of the cold and dusk and loneliness of her surroundings.

All this is what my botanist friend tells me, for he found *Calypso* a year or so ago in northern New Hampshire after years of hunting for her. He grew up in that country north of the White Mountains and had, early in his life, become a lover of Nature, climbing the hills and tramping the pastures and fields and wading the streams and swamps, in search of flower and fern, bird and fish.

Years ago he read of *Calypso bulbosa* (or *borealis*, according to Gray) and began to search for her. Each spring he went through the bogs and swamps of the surrounding country, beginning the hunt early, because some authorities claim that *Calypso* blooms as early as the third of May in that latitude, but never could he find her. A year ago last June, however, he was rewarded. He discovered rare *Calypso bulbosa* in Colebrook, much later than he would have expected and quite by accident.

So he carefully removed her, bulb, blossom, leaf, mossy bed and all, and brought her down to Maine, where, after having her photographed in different poses, he tried to make her feel at home in a cool, shady, wet spot in his own woods. But *Calypso* was homesick; she pined for the chill, soft moss of the tamarack swamp, and when spring came again her bulb put forth no blossom, no leaf; her spirit had returned to the North.

But the story of the finding of *Calypso* was told far and near. Great men wrote to the botanist congratulating him upon his good fortune because of all the forty-four varieties of orchid found in the New England states, she is counted the rarest and most beautiful. It seemed that all who had ever seen the flower were still under her spell and those who had never seen her were filled with a deep longing to do so.

His experience accorded perfectly with that of John Muir who wrote of *Calypso:* "The rarest and most beautiful of the flowering plants I discovered on this grand excursion was *Calypso borealis* (now *bulbosa*), the Hider of the North. I had been fording streams more and more difficult to cross and wading bogs and swamps that seemed more and more extensive and more difficult to force one's way through. Entering one of these great tamarack and arbor-vitae swamps one morning, holding a general though very crooked course by compass, struggling through tangled, drooping branches and over and under broad heaps of fallen trees, I began to fear that I should not be able to reach dry ground before dark and would, therefore, have to pass the night in the swamp. I began, faint and hungry, to plan a nest of branches on one of the largest trees or windfalls, like a monkey's nest,

or eagle's, or Indian's in the flooded forests of the Orinoco.

"But when the sun was getting low and everything seemed most bewildering and discouraging, I found beautiful *Calypso* on the mossy bank of a stream, growing, not in the ground, but on a bed of yellow mosses in which its small white bulb had found a soft nest and from which its one flower and one leaf sprung. The flower was white and made the impression of utmost purity like a snowflower. No other bloom was near it, for the bog a short distance below the surface was still frozen, and the water was ice cold. It seemed the most spiritual of all the flower people I had ever met. I sat down beside it and fairly cried for joy.

"How long I sat beside *Calypso* I don't know. Hunger and weariness vanished, and only after the sun was low in the west I plashed through the swamp, exhilarated as if never more to feel mortal care."

CALYPSO IN HER BED OF MOSS, NATURAL SIZE

Beside her is her single leaf. To find this bloom is the hope of every botanist

Tweedy's Bitter-Root

By J. WILLIAM THOMPSON

THERE are known at present twenty-five kinds of bitter-roots (*Lewisia*) and while many of them are attractive, yet most will agree that Tweedy's bitter-root is the queen of them all. This is because of its large size and singular beauty. The full grown plants are nearly a foot across the shining green basal rosettes. The flowers are borne on slender stems about nine inches high. Each flower is more than an inch in diameter and a lovely pale creamy apricot in color. Old plants have about seventy-five blooms each year, and occasionally as many as a hundred. The large fleshy roots are spread out near the surface of the soil or crowded in the crevices of broken granite. The melting snow furnishes practically their only moisture.

PHOTOGRAPH BY H. W. HIGMAN

TWEEDY'S BITTER-ROOT JUST BLOOMING

This plant was found growing in the crack of a limestone cliff in Tunwater Canyon

It is conspicuous when in bloom in May, and it is then that hordes of wild flower vandals and rock garden enthusiasts sally forth to dig up auto-loads of the helpless things, most of which die when transplanted in the moist climate west of the Cascade Mountains. Their home is in the Wenatchee National Forest and they are protected by law, but it is inadequately enforced, and arrests have been few in the past.

The seeds are said to germinate readily, but unfortunately it ripens only a few seed. Scores of plants were examined to secure perhaps two dozen seeds which were sent to the New York Botanical Garden for scientific experimentation. Several living plants were also sent, and it is to be hoped that this unusual plant will find its way from there into general cultivation.

This bitter-root was discovered by Mr. Frank Tweedy while connected with the North Transcontinental Survey which was sponsored by the Northern Pacific Railway. It was named in Tweedy's honor by Dr. Asa Gray as *Calandrinia tweedyi;* but later botanists prefer to include it with the genus *Lewisia* as *Lewisia tweedyi.*

It is an *endemic,* as botanists call any plant with a decidedly restricted range. It is known locally as rock lily, but this name is unfortunate because it is not a lily at all, but a first cousin of the eastern spring beauty, and because the name rock lily has already been applied to several plants.

The people who selected *Rhododendron californicum* as the State Flower of the State of Washington passed up a great opportunity of selecting a real native plant for its emblem instead of one bearing the name of another State. A visitor to the yellow pine forests where it likes to grow cannot resist the temptation to stop and admire each and every plant. One never tires of it.

"WINNIE", THE VINEGARROON—A PORTRAIT

The vinegarroons, or whip-scorpions, are related to the true scorpions but have no stinging spine and their bite seems to be entirely harmless to man, although they are generally feared and believed to be venomous by people in the southern states and Mexico, where they live. They are found mostly in the dark in burrows or under dark cover, and they feed on such small animals as they can capture with their strong pinching claws. They are known to capture and eat caterpillars, cockroaches, grasshoppers and even young toads and frogs. Like scorpions, spiders and some ants, their predatory habits are generally considered useful in the world's economy and in Nature's scheme

"Winnie", the Vinegarroon

Some observations of a whip-tailed scorpion who broke up a fishing expedition

By GUY VAN DUYN

WHY "Winnie"? Well, we just called her that because it seemed to fit. "Vincent" might really have been more applicable for all I know—arachnids being a bit out of my line.

Winnie presented a bedraggled appearance when I discovered her. Two of her legs had several joints missing and her cephalo-thorax was flecked with dried New Mexico mud.

I had been trying to coax a few bass for our supper out of a clear little spring-fed creek which runs into Black River, which in turn empties into the better known Pecos River. Only two fish had responded to the artificial lures that I had to offer, when a careless grasshopper showed the way by miscalculating the distance to the other bank. So I devoted some time to catching grasshoppers to grace the small hook which I had promptly substituted for the artificial bait on my line.

Three hoppers already reposed in a match-box when I perceived something which I at first glance took to be a crawfish progressing laboriously through the jungle of short grass. A second look told me what it was, although I had never before seen one. The frontal aspect proclaimed her a scorpion, although the heavy-duty claws looked more like boxing gloves than the slender, crab-like pincers of regulation scorpions. Heavy projections at the "shoulder" joints bristled with sharp points—a further aid, no doubt, in holding any prey secured. The posterior half of her anatomy, the abdomen, differed greatly from the slender, segmented and mobile one of familiar scorpion type. It was flat and rounded, nearly as broad as it was long, and, instead of the sharp, claw-like stinger at the end, was furnished with a slender, thread-like tail, an inch and a half long. The tail was segmented and flexible but apparently not mobile, except for the swivel joint at its base. Its purpose was obscure; it looked more like an antenna than a weapon. But that tail clinched matters as far as my conclusions were concerned.

A whip-tailed scorpion, or vinegarroon; it couldn't be anything else. Vinegarroon! That awesome critter for which a frontier town in Texas had once been named by

its founder, the redoubtable Roy Bean, self-constituted justice-of-peace, saloon proprietor and sonorously self-styled "The Law West of the Pecos". Later, it seems, the old boy went plumb loco over a gal he had never even seen except in a newspaper clipping—the famous "Jersey Lily" Langtry—and he promptly and officially changed the name of his town to Langtry. But that's another story.

Winnie was feeling her way along, in a manner strikingly similar to that of a blind man probing the unknown with his cane. Her "cane" was the remaining one of a pair, its mate a mere stump, held aloft. Apparently they were the first pair of legs, greatly elongated and situated just back of the large claws, although they certainly did not serve in such capacity, locomotion being provided by three pairs of legs of sturdier construction. Besides being made up of longer and more slender sections, their joints differed from the hinged ones of the proper legs, being more on the order of universal joints. This arrangement permitted great mobility, and Winnie stroked each blade of grass inquiringly and ever so lightly—first one side and then the other.

I laid down my rod, squatted and looked closely for eyes but could discover none. If present, they must have been very minute and inadequate, for Winnie did not sense my presence. She continued her search—perhaps for the proverbial needle in the haystack.

Suddenly she seemed to stiffen. Her feeler had touched my silk line. She felt, gingerly, running the feeler appraisingly over it and advanced cautiously. An inch or two farther on the feel of my casting rod produced another distinct shock. Winnie was visibly affected—on the alert. But she didn't retreat in trepidation; on the contrary, her husky claws spread wide apart as she stalked her supposed prey. Another stealthy step or two and those jaws closed, trap-like, upon the rod!

The emotions she registered were amusing—a mixture of surprise and chagrin. For a moment she seemed positively embarrassed; then she relinquished her hold and went on.

My fishing was forgotten in this fascinating game of blindman's buff. I bethought me of my grasshoppers and wondered whether Winnie, too, might be in search of such bait. Holding one of them by its wings, I placed it experimentally in her path.

At the barest touch of her feeler on one of the hopper's front legs she was instantly on the alert, claws wide-spread. No fooling, this time! Her claws flashed around the grasshopper in fatal, crushing embrace, bringing its mangled form in contact with her mouth where spider-like mandibles set to work.

As the meal progressed I wondered what might be her reaction to the possibility of another dinner. I proffered another grasshopper, placing it within range of her restless feeler. Such opportunities apparently did not knock at Winnie's door too often for she wasn't slow to take advantage of the situation. The hopper was unhesitatingly seized and crushed against the first victim.

That settled it. If Winnie was going to be so easily provided for, I determined to give her house-room along with the other tenants—a collection of miscellaneous live reptiles that I was accumulating. Temporarily, she was confined in the only available receptacle—the match box, which still contained a grasshopper.

The sun was setting when I returned to our camping place and I left Winnie in her close quarters while I turned my attention to the camp fire and freshly-caught fish.

Later inspection revealed that in spite of the limited space in her cell, she had managed to seize the third grasshopper. A large glass jar provided more room and I left her there to her own devices when we rolled into our blankets. In the morning only a few shreds of legs and wings remained of the grasshoppers, in testimony of her nocturnal feast.

Winnie was slated for a long trip East but fate decreed otherwise—she "went West" after a couple of days in the lap of luxury. Whether her demise was due to an overly rich or abundant diet I shall not venture to say. It may have been merely a case of Nature taking its toll of old age, for all I know.

Vinegarroons are reputed to exude an odor like that of vinegar—hence the name. I was never able to detect any such unpleasant feature in our Winnie, perhaps because the alkali dust had dulled my olfactory organs. But I must confess that, during her lifetime, I wasn't prone to put my nose into Winnie's business—in that sense. Vinegar happens to be something that doesn't exactly whet my appetite; still its debatable fragrance must be conceded preferable to that which assailed my nostrils when I attended Winnie as coroner.

Her mausoleum is a small glass jar where she now rests, in all her battered glory, embalmed in alcohol.

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THE OCTOBER ISSUE

With the October issue of Nature Magazine, we will inaugurate a new feature which, we feel sure, will be welcomed by every reader. It will be a part of every issue from October on. Otherwise we will let this be a surprise and not take the edge off by going into details in advance. This new feature will tell its own story. In this issue we inaugurate the Hiking and Camping Department under the able direction of Mr. Ernest A. Dench, widely known hiker and writer on hiking subjects. This department is in response to the definite interest indicated by our readers when Mr. Dench's hiking articles appeared in our June, July and August issues. We want this feature to be of service to our camping and hiking minded readers and they have only to call upon us and Mr. Dench for any service in this field.

Yarrow

An Interesting "Sweet-Smelling Herb"

By F. LAMSON-SCRIBNER

Photographs by the Author

THE great Aster Family, to which yarrow, *Achillea millefolium*, belongs, numbers many thousand species and is of world-wide distribution. For the most part they are everywhere noted for their radiant beauty in the form and color of their flowers, ranging from white through shades of yellow to delightful blue or purple tints. Throughout all this brilliant array of blooms, there is a remarkable absence of the sweet floral fragrance that adds such charm to other prominent plant families, especially the rose and lily. There is, however, an ill-defined group of species in the Aster Family which, through special secretions in the tissues of their stems and leaves, emit characteristic odors that have given these plants a place along with the "sweet-smelling herbs." These were hung on the lintels and door posts in many a rural home of the early settlers, adding an agreeable pungent fragrance to the air in living rooms, or preserved for use in seasoning foods, making "tea," or in the preparation of old-time household remedies for colds, blood impurities and other ailments.

From the first, yarrow had its place among these "sweet-smelling herbs," and it soon became widely distributed in America and was one of the best known plants in the stock of herb doctors who recommended strong infusions of the leaves and tops "to purify the blood and tone up the stomach," while a good drink of a hot infusion of the leaves was deemed very useful to break up a common cold. Because of its astringent nature, it is valued as a vulnerary, and, according to mythological legend, yarrow was used by Achilles to heal the soldiers of his army wounded during the siege of Troy. Hence, the name of *Achillea* applied to this plant by botanists.

Yarrow is known to many by the more descriptive name of Millfoil because of its much divided leaves. It grows naturally by roadsides and waste places in nearly every country of the north temperate zone. Sometimes it encroaches upon lawns and cultivated lands, when it becomes a troublesome weed; its perennial creeping root stocks are difficult to eradicate when once established. The upright and rigid stems are about a foot high, branched at the top and crowned with a flat corymb of white or rose-colored flowers. The central florets in each head are tubular and perfect. The ray

A CLUMP OF GROWING YARROW

Below, the seeds of this plant of the fields shown here in magnification

florets, rarely more than five in each head, are pistillate. The blooming period is from June to October.

The leaves are finely divided into many linear segments. The flattened seeds are illustrated, much magnified.

There are about forty species in the genus *Achillea.* One species grows to about the height of five feet and has yellow flowers; others are only a few inches high and their moss-like leaves make a lovely dark green ground cover like a carpet. Another species that has been found in a few places in this country has narrow, undivided leaves which are very unlike those of the common yarrow.

If a plant may be known by the company it keeps, it is informing to mention some of the associates of yarrow. There is tansy with its bitter taste and strongly aromatic odor; chamomile with its strong but agreeable scent; common wormwood, the bitterest of them all, with powerful medicinal qualities. The common field daisy and feverfew, prized by florists, are relatives.

Whence the Little Redfish?

By THEODORE G. LANGGUTH

OLD TIMERS tell us that years ago the blueback or sockeye salmon from the Pacific Ocean came to the small lakes of the Sawtooth Mountains in Southern Idaho, a journey of more than a thousand miles, as the fish swims. Having reached their destination, these redfish, as they were called, completed their spawning in or near the outlets of the lakes. Time brought changes. Water was used for irrigation and for mining purposes. Dams were constructed, and now, the blueback, sockeye, big redfish, or red salmon —take your choice of names—seldom, if ever, reach their former spawning grounds in the Sawtooth Mountains.

PHOTOGRAPH BY E. R. BENNETT

REDFISH LAKE IN IDAHO

Here is found the little redfish of mysterious origin. The range in the background is the Sawtooth

The adult blueback salmon is a beautiful fish, clear blue in color and silvery, weighing up to five or six pounds. During the breeding season its color changes and it becomes brick red, except the head, which is a dull green.

Redfish Lake, Alturas Lake and Stanley Lake in the Sawtooth Mountains, are headwaters of the Salmon River in Southern Idaho. Here is found the little redfish. This interesting little fish reaches maturity when it is six to twelve inches in length. Occasionally a male is found fourteen inches long. The largest I have ever seen, among thousands, was between fourteen and fifteen inches.

The little redfish is bluish and silvery, and inhabits the depths of the lakes where it is caught with hook and line. In late summer and autumn schools of them come into the shallow inlets of the lakes to spawn. It then becomes red in color, just as the blueback salmon or big redfish does at spawning time. The little redfish is a typical salmon in appearance and in structural characteristics. That the little redfish twelve inches long is fully matured is evidenced by the thickness of its skin, hardness of the bones, and size of the teeth. The male little redfish at breeding time is a dwarf image of a salmon. Its snout is long and hooked over the curved tip of the lower jaw, the fish is flat, slab-like. It dies after spawning.

It seems certain, although it will always remain a mooted question, that the little redfish is a blueback, sockeye salmon, or big redfish, that in years past became resident in these fresh-water lakes of the high mountains. While not exactly land-locked there, the young that were hatched near the outlets of the lakes for some reason did not migrate to the ocean. Instead, they entered the lakes and remained there, becoming a dwarfed form of salmon, through continuous residence in fresh water and conditions of food and environment.

Against this supposition is the natural instinct of all young salmon to find their way to salt water, wherever possible. If the little redfish is a fresh-water, dwarfed salmon, why, in the beginning, did they take up residence in these high lakes, instead of following that strong natural instinct of young salmon to drop back to the ocean? Perhaps the first little redfish did try to travel down stream, and, finding a dam or some other unusual condition, returned to the lakes. Then, having a cycle of life there, future generations of these fish forgot all about the call of salt water and made the lakes their home.

Through fish hatchery operations, the little redfish has been propagated in other waters, being christened with a new name, silver trout; although in no place, as far as I am able to learn, has it grown to large size. It remains a unique fresh-water game fish, having all the characteristics of the Pacific salmon, lacking only that epic of the fish world—migration to salt water.

A DEEP-SEA GROUP OF FISHES WITH AN EFFECTIVE ILLUSION

Here the inhabitants of the depths are seen in a setting of corals, sponges, sea pens and sea fans. The large specimen above is a lancet fish. The curious sheepshead crab is seen in the lower foreground

HABITAT FISH GROUPS

Museum brings the bottom of the sea to the visitor

By HOWARD R. HILL

Zoologist, Los Angeles Museum

MUSEUMS have found the habitat group the most instructive method of exhibiting animal life. In a habitat group, mounted animals are arranged in life-like attitudes and placed in a setting which is an exact replica of the actual natural environment. This method has been used for many years for displaying reptiles, birds and mammals. Only recently has it been applied to the exhibition of fishes. However, in fish habitat groups, the specimens are not mounted but are life-size plaster casts, painted to reproduce the natural colors of living fishes.

The Los Angeles Museum has completed two large fish groups which have attracted considerable attention. These portray different phases of marine life along the coast of California. The "Catalina Island Submarine Group" represents conditions at a depth of six fathoms near Catalina Island. Common shallow-water fishes are shown, some swimming at the surface, others seeking food among the kelp fronds or nibbling at the sea mosses attached to rocks. A subdued lighting effect and dull background create the illusion of water and give the visitor the impression of really looking under the sea.

The "Red Rock Cod Group" is a glimpse of marine life at one hundred fathoms. At this depth, there are no plants, but the rock-fishes and other deep water species are seen feeding among the plant-like animals such as sea fans, sea pens, corals and sponges. The lancet-fish with its sail-like dorsal fin and savage looking canine teeth presents the only note of discord in this otherwise peaceful setting.

In the construction of a fish group, the background is painted by an artist while the artificial rocks and plants used in the setting are made by accessory experts. The preparation of the fish casts is the work of a modeler or sculptor. First, a newly-caught fish is posed in a natural position. Plaster molds or impressions of the specimen are next taken and these are used in forming the cast. Artificial fins are then cut from thin sheets of celluloid

A GROUP SHOWING SUBMARINE LIFE OF THE CATALINA ISLAND WATERS

The rock vegetation, kelp and near-shore fishes are faithfully and carefully reproduced. A California halibut is seen in the foreground and on the left appears a shark

and inserted in their proper places. When glass eyes have been fastened into the eye sockets, the cast is ready to be painted and the color markings of a fresh fish are carefully copied on the cast. Best results have been obtained by using nitro-cellulose lacquers instead of oil paints. Sometimes "pearl essence" is mixed with the lacquers to produce the lustrous appearance of natural scales and to show the iridescence and metallic reflections seen in living fishes. Fishes reproduced by this method are not only life-like but durable and are a distinct improvement over the specimens mounted according to former methods of taxidermy. Thus these groups are museum masterpieces.

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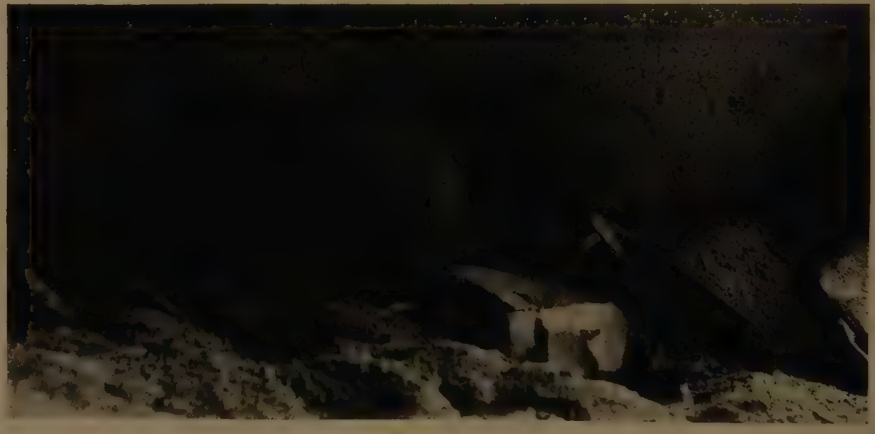
Revivified Beans

By BRUCE BRYAN



REMINISCENT of the grains of wheat taken from a 3000-year-old Egyptian tomb and grown on a farm near Pomona, California, are the two beans found not long ago in Gypsum Cave, Nevada, where remains of primitive man have been unearthed in association with the bones of the extinct ground sloth, *Nothrotherium shastense*. The early Pueblo Indians grew such beans, but these were found in a pocket that was buried in a layer of known Ice Age date.

The Egyptian wheat has been revealed time and again to be a hoax played on unsuspecting tourists, who believe they are buying the newly-discovered contents of some ancient jar and are actually purchasing a fakir's substitution. But the beans found in the Ice Age stratum of Gypsum Cave were sent to the agronomy department of California Institute of Technology, where one of them was planted and actually germinated, bearing a crop of beans.

It didn't seem reasonable that dormant life should exist for perhaps 10,000 years, even in a bean stored in a dry old cave. It is reported that the archaeologists were much relieved when they subsequently found that a series of tunnels bored by pack rats connected with the ancient pocket. And the beans were seen to have marks of little teeth on them. Recent Paiute Indians probably grew them.

Leaves That Sleep at Night

By GEORGE A. SMITH

Did you ever go out on a dark night with a flash light in your hand to see if the leaves had gone to sleep? If you have not, you will be surprised to find that the leaves of a number of our common plants go to sleep at night.

Examine the common clovers and you will find that they put their leaves to sleep in a remarkable manner. In the common red clover, the two leaflets on the sides fold downward while the end one is bowed over them. The leaflets in this sleeping position remind one of two tiny hands clasped in prayer under an innocent little head.

The leaves of the white and the yellow sweet clover become restless at dusk as if the sandman was luring them into pleasant dreams. The two side leaflets tend to face the north with their upper surfaces, while the terminal leaflet bends east or west to meet one of the other leaflets. It is interesting to note that in this arrangement one is always left out in the cold. It appears that three children are too many for one little bed since the unprotected body of one leaflet must always remain out in the cold.

The leaves of the lupine family sleep in several different ways. The leaves of the common blue lupine form a horizontal star during the day, but at night the leaflets droop and form a hollow cone with the base upward. In the yellow lupine, the opposite arrangement is found. The leaflets rise and the cone is inverted. In many other species of the lupines, the shorter leaflets of the star arrangement fall and the longer ones rise, and so together form a vertical star.

Almost everyone has noticed the sleeping position of the leaves of the wood-sorrel family, either the wild

oxalis, which is pictured here, or the potted varieties grown in houses for ornamental purposes. As dusk approaches, the leaflets on each stem begin to fold downward and continue until their backs are close together. In this restful position the leaves of these plants remain until bright light returns. Even on a cloudy day the leaves will droop to some extent, reacting to the fading light.

Extensive studies have been made as to the causes of leaf movements at night, and the object in every case seems to be to protect the sensitive surfaces of the leaves from the harmful effects of the lowered temperature during the night.

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A Robin's Sense of Color

By ROBERT HENRY MILLER

WE WERE sitting on the front porch, watching a robin carry building material from the lawn to the limb of an oak where her summer home was going up in full view. Her nest building was in its early stages. She was laying the foundation. String seemed to be her favorite material for this. She would alight on the lawn, take a few hops, then duck her head into the grass and fly away with the string.

John David, who was six, had a happy idea. He ran to the kitchen for a ball of string. Breaking off pieces a yard or less in length, he scattered them on the front walk underneath the nest.

When Mrs. Robin returned she wove her string into the growing nest, stood erect for a moment, head atilt as though she were attracted by some object directly beneath her. Then she dropped to the walk where the pieces of string lay, not more than ten feet from the place where we were sitting. Before picking up the string she paused and looked directly at us, which, in bird language, meant, "Thank you."

She was careful in picking up the string, that no long streamers should trail behind her to become tangled in her propellers and fins.

For quite a number of minutes first John David and then Mrs. Robin visited the front walk. He would place a new piece of string there and she would take it to her building site.

Then someone wondered if Mrs. Robin had a sense of color. So far John David had given her only white string. So he got some red string and put pieces of it on the walk along with the white. But she would have no red string in her house, she carefully selected only the white.

Some one suggested tying a short piece of red string to a piece of white. Maybe we could fool her. We thought we had won, for she carried the line up to her nest and had begun to weave it in. When she saw the red string, however, she angrily pulled the whole piece out and let it fall to the ground. Her next trip was to the lawn. She thought that a better source of supply.

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First Whooper Swans

By JACK VAN COEVERING

THE first whooper swans ever to be reared in the United States are now maturing at the W. K. Kellogg Bird Sanctuary near Battle Creek, Michigan, says Dr. C. L. Sibley of Wallingford, Conn., outstanding aviary man and game breeder. The swans were hatched on June 6, 1933 at a nest built by the parents among the cat-tails of the sanctuary. Ever since they came to the Sanctuary from Europe, where they were wild-trapped five years ago, the adult swans have practised at nest building, but they never laid eggs until last spring, when the two swans in the picture were successfully hatched and reared. One adult swan is at the extreme left. Note the gray backs of the young, which will change to white as they become fully mature. Dr. Miles D. Pirnie is director of the Sanctuary where these first American-born whoopers are being reared.

The Child and a Garden

By RUBY NEVINS

KINDERGARTEN CHILDREN AND THEIR SCHOOL GARDEN
They learn to know and to care for flowers and lay the basis for a knowledge and appreciation of the outdoors and of all Nature

VITAL experience with Nature is the rightful heritage of every child. If contacts with Nature are provided during the formative years of childhood the youngster is assured of securing from life one of its greatest treasures—an appreciation of the beauty and wonder of the world about him. The outdoors takes on a new meaning for him and he becomes conscious of his kinship to all Nature.

A garden experience offers a strong appeal to the child. Pleasure and delight accrue to him through a natural love for beauty and flowers. It is a real experience, there are real things to do and real things to think about. Beauty envelopes the whole process and an ideal environment is produced through the cooperation of the child. Ideas, ideals and attitudes develop out of such an experience and it furnishes the material out of which real learning evolves—the re-making of life through the re-forming of the child's own images.

Here lies the teacher's opportunity to provide contacts which will lead the child to see, hear and feel Nature and thus make a joyous companion of her. The child's whole being must be attuned to the voice of Nature if the meaning underlying her beauty and harmony are to become a part of his life. To her, then, he will turn for inspiration. Her beauty will renew his spirit, answer his questions and stimulate him to further effort. Sometimes one must turn and drink from a well of inspiration in order to renew faith, so to Nature will the adult turn if as a child he has learned her secrets. Her beauty and the satisfying power she possesses offer to the world a key with which to unlock the source of power. The wise teacher therefore would guide the child to this other teacher whose power to satisfy through beauty, order and generosity knows no equal in this world.

That vital contacts with Nature through real experiences lead a child to an understanding and appreciation of the beauty and wonder of Nature was evidenced one springtime in the Kindergarten at the Wilson Teacher's College. These children became observers, explorers and guardians of the dependent living things they found in their environment.

At Easter a trip was taken by the Kindergarten to a local florist shop. Upon their return to school the children decided to build a flower shop. A variety of plants were brought from home. Branches of fruit trees, sprays of forsythia and lilacs gathered from the gardens at home were brought in. These were always cut, never ruthlessly broken off. Nasturtium seeds which had been planted in egg shells at school were carefully transplanted so that no harm would come to the little plants.

A garden was also planned at school, the soil was prepared and vegetable and flower seeds were carefully planted by the children. This garden was watered, weeded and cared for by the children in the Kindergarten. The day the radishes were pulled and taken home to share with the family was a joyous one. The children were deeply interested in the fact that the radishes had grown from the little seeds that they had planted.

A sand table in the room had been filled with soil and some of the more common wild flowers had been planted there in order that the children might learn to recognize them and care for them. The children learned to know and love these wild flowers and also learned that it was best not to pick wild flowers in great numbers because they grew better and were more beautiful in their own habitats. The day came when the children chose the flowers from the table that they wished to take home. These they planted in sheltered nooks in their gardens at home. Violets and bluets were much loved by these little children.

From such an experience the child gains not only pleasure and delight but attitudes which play a dominant

INSPECTING THE BLOOMS IN THE SCHOOL GARDEN

A scene at Wilson Teacher's College in Washington, D. C., where the author of this article is Kindergarten Supervisor

part in his well-being. Chief among these is enjoyment of the great outdoors and Nature pursuits. A way is presented of employing his leisure time that is practical and healthful. The world of books and pictures offers him inimitable treasures relating to this interest.

The modern school's appeal to the parent is marked. Hearing of the interesting things that their children are doing brings the parents not only to the door of the school, but into contact with the school work itself.

The child, through the Nature interest that has been motivated at school, leads his parents to a greater appreciation of Nature. Among the many environmental experiences which the children in the Kindergarten have had with their parents were visiting flower shops, private gardens, greenhouses, flower shows, local parks, nearby woods and making gardens together at home. Such contacts contribute to the happiness of adults and children.

Mental and emotional health are fostered by such enjoyable use of leisure for the whole family. Interests are broadened and both parents and children gain an increasingly intelligent appreciation of Nature. With a mind so equipped one is fortified against poverty, misfortune and loneliness. Walks through the woods become happy trails and glorious adventures of discovery. A realization of the beauty of the commonplace ensues for both child and parent.

Insight leads to understanding and the child, through the guidance of the teacher, becomes the protector of Nature, never the ravager. The woods, the fields, the hillsides, the gardens become his friends because of his knowledge and love of them. The garden visitors such as the birds, bees and butterflies intrigue the imagination of the child and open up channels of thought that, if pursued, offer knowledge and delight which last as long as life itself.

The garden theme is eternal in essence and will bring forth the sweetest harmony in the life of the little child if his guardians, both parents and teachers, will but touch the chords of his being that lie so responsive to it.

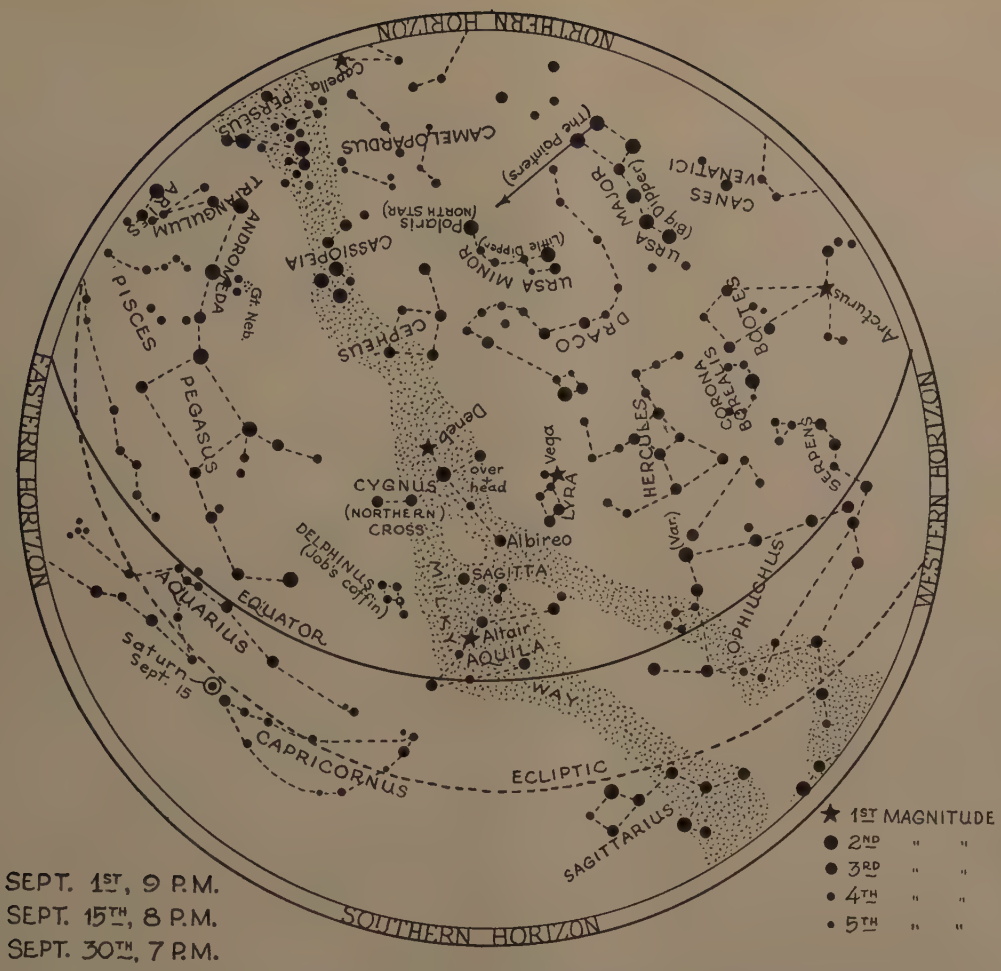
True creative expression, which belongs to man alone on this earth and marks the way of progress of mankind, finds its source in Nature. To those who hold communion with her she speaks, and there ensues a reverence for an unseen power and a vitality of spirit that creates a picture, a song, a poem, a book or a constructive life.

Ivan, A Diver

By
DRAPER WILLIAMS

IVAN and I were out for a hike one hot day and when we came to the shore of a creek I decided to swim. I slipped out of my clothes and plunged into the water. When I came to the surface there was Ivan swimming after me. He had not had to take off his clothes because Ivan is my pet Rhesus monkey.

This was the first of many swims after I discovered that my monkey was much at home in the water. In fact, he puzzled me by being able to stay under water longer than I can and by diving. I knew that his lungs did not have the capacity of my own. The mystery was finally solved while both of us were swimming under water, Ivan close to me. His cheek pouches were bulged out. There was his store of air. In order to be sure I watched Ivan carefully when he was about to dive. Sure enough I could see him draw in the air to fill the pouches. This store of air plus what he had in his lungs gave him oxygen under water.



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south

Life on Venus and Mars?

Why these planets may sustain life

By ISABEL M. LEWIS

THE ONLY two planets in the solar system, in addition to the earth, that the astronomer is willing to concede may support life are our next door celestial neighbors, Venus and Mars. Yet how different in appearance and physical characteristics are these two little worlds!

The orbit of the earth lies between the orbits of Venus and Mars, the orbit of the latter being on the side of the earth farthest from the sun, and the planet coming, at nearest approach, within about thirty-five million miles of the earth. Venus at inferior conjunction with the earth is distant only twenty-six million miles. It is nearly the twin of the earth in size, mass and density. A man weighing 150 pounds on the earth would weigh about 128 pounds on Venus. He would weigh only 57 pounds on Mars because its diameter is not much more than half that of the earth, its mass is only about one-tenth and its surface area is less than one-third. Yet as to its seasons and the length of its day Mars differs little from the earth. The Martian day is about forty-one minutes longer than the terrestrial day, and the inclination of the Martian equator to its orbit is about twenty-five degrees. The inclination of the earth's equator to its orbit is about 23¼ degrees, which means that the change in the inclination of the sun's rays to the surface during the Martian year is much the same as it is on earth during the terrestrial year. But as the Martian year is nearly twice as long as the terrestrial year the Martian seasons are nearly twice as long as ours.

The length of the Venusian year is about 225 days, but we know nothing regarding the length of its day due to absence of surface markings. In fact we probably will never see the surface of Venus because it appears to be enveloped perpetually in a veil of dense, atmospheric

haze. The atmosphere of Venus is known to be nearly as dense as that of the earth, and one of the most interesting facts discovered recently regarding this planet is the existence of strong bands of carbon dioxide in the infra red of its spectrum, although there is no indication of any appreciable amount of water vapor or oxygen. It has been estimated that the intensity of the bands of carbon dioxide observed is such as would correspond to a depth of one-half mile of this gas. It must be kept in mind that the presence of carbon dioxide in the upper strata of the planet's atmosphere, which are the ones observed, and the absence of water vapor and oxygen in appreciable quantities in the same strata shows nothing as to the presence or absence of the same gases at the surface of the planet. We know nothing about the composition of the atmosphere at the surface of the planet. There seems to be evidence of the existence of an isothermal layer, or stratosphere, on Venus such as is present in the earth's atmosphere with a temperature of about 25 degrees Fahrenheit, or 40 degrees warmer than the stratosphere in the earth's atmosphere.

The discovery of carbon dioxide in the upper atmosphere of Venus leads to some interesting speculations as to its origin. Carbon dioxide, as is well known, is used by plants in forming complex compounds that are used as food by themselves and other living beings, and oxygen, which is the breath of life to animals, is a by-product of this process. Carbon dioxide is also emitted by volcanoes in enormous quantities and there is the possibility that the unusually great amount of carbon dioxide in the atmosphere of Venus is due to intense volcanic activity. The temperature of the surface of a planet is greatly affected by the presence of water vapor and carbon dioxide in its atmosphere. If these two substances were not present in the atmosphere of the earth it would experience great extremes of heat and cold.

The presence of carbon dioxide in the atmosphere of Venus in such great quantities as have been observed must have a great effect on its surface temperature because it is a great absorber of heat. It is believed that the day of Venus is much longer than that of the earth, but yet there is little difference in the amount of heat radiated from the day and night sides, and the large amount of carbon dioxide in the planet's atmosphere may play an important part in equalizing the temperature on its surface. It is certain that the temperature on Venus must be much higher than that on our own planet. The opinion is quite generally held by astronomers that Venus is not as far advanced in evolution as the earth, while Mars is a much older world.

There is no question that the atmosphere of Mars is extremely rare. Bodies of small mass, such as Mars, cannot permanently hold an atmosphere. Mars is much smaller than the earth and Venus and has probably run its course of evolution much more rapidly. Water is scarce and probably supplied chiefly by the seasonal melting of the white polar caps, which, it is reasonable to assume, are composed of snow. The observed darkening of extensive areas with the advance of spring in the hemisphere turned toward the sun at the same time with the gradual shrinking of the polar cap in that hemisphere would be difficult to explain without the assumption that it is due to vegetation stimulated to growth by the release of water from a melting polar cap. Spectroscopic observations of the planet's atmosphere indicate that oxygen is now scarce on the planet. That it once existed on Mars in considerable quantities is implied by the presence of the vast reddish and yellow colored areas covering about three-eighths of the surface and due probably to the oxidation of rocks once containing iron in the ferrous state. In the long continued process of weathering, such rocks would absorb fifty per cent more oxygen, gradually depleting the oxygen supply in the air and forming reddish ferric compounds in red rocks and desert sands. If this process is still going on the supply is becoming increasingly scarce and the problem of the conservation of the supply of water and oxygen would be a serious one for intelligent beings.

The surface of Mars is clearly visible because of the rareness of its atmosphere and it shows a wealth of detail when viewed telescopically. In addition to the vast, reddish, desert-like areas, which show no change, and the polar caps, and the great, dark areas which are of great extent and undergo remarkable seasonal changes, there exists a net-work of fine, dark lines most of which are visible only when the seeing is exceptionally fine. These are the canals of Mars over which there has been so much controversy. The theory has been advanced that they may be strips of vegetation bordering waterways which are not necessarily of artificial origin. They cross the reddish areas as well as the dark areas and frequently meet in dark spots, a hundred miles or so across, called oases. They are probably the most remarkable and interesting markings on the surface. The larger and coarser canals are easily detected and have also been photographed. Interesting experiments with very delicate and sensitive heat recording devices have proved that the temperature of Mars at the equator when nearest the sun is about sixty degrees Fahrenheit.

From what has been noted regarding the atmosphere of Venus and Mars and their physical characteristics, so far as we know them, one would hesitate to say that life on either of these planets is impossible. We are at present not in a position either to affirm or to deny the existence of life on either of these neighboring worlds.

Jupiter and Saturn are both visible in the evening sky this month. At sunset on September 15 Saturn is well up in the east and visible the greater part of the night. Jupiter is low in the southwest near Spica at sunset the first of the month. It is approaching the sun and is poorly placed for observation later in the month.

Mercury is also an evening star this month, but is too close to the sun to be seen. Venus and Mars are both in the morning sky. Venus is due east and near the horizon at sunrise, while Mars is at a much higher altitude.

On September 23 at 12:46 P. M., Eastern Time, the sun will cross the equator going south and autumn will begin in the northern hemisphere.

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Early Birds

By
JANE ADAMS PARKER

ALTHOUGH it was early spring, still it was quite cold. The wind sang, "Ooooooooo," through the tree tops, and most of the little creepers and crawlers were hidden away in their winter quarters.

Cheery Johnny, the cricket, stuck his head out from his cozy nook under the back steps. He whisked his long feelers this way and that, as if wondering if it was too cold to venture out. He did not want a chill.

Usually crickets do not live through the winter. But sometimes you do find a little fellow like Cheery Johnny, who has crept away in a snug corner while the wintry winds whistled around the chimneys, and the snow piled in great drifts outside.

How cold and lonesome one little cricket would look, hopping around without a single other cricket to keep him company. But Cheery Johnny didn't mind. You see, when he was a wee baby just hatched out from the egg his mother had put into the ground, he had scrambled up into the big, wide world, all by himself. And there he was, hardly larger than a good-sized flea, with no one to watch after him.

So he had to learn how to take care of himself. If he had not, there would not have been any Cheery Johnny—very long.

Quite slowly, for he is usually such a spry fellow, he ventured out a little farther. If it had been in the late summer, he might have stopped to raise his wing cases and rub them together to give a tune. But he seemed to be standing there, just enjoying the warmth of the bright sunshine. Or, maybe, he was listening with the little ears he carries on his front legs, to determine if it was safe.

Then suddenly he darted off, running over things and peeping under others, as if he were trying to find where some of the other little people were hiding away.

Just as he reached the wood-pile out fluttered Mrs. Mourning Cloak, the butterfly, for a sip of early breakfast. Next Cheery Johnny ran over to a pile of brush in the fence corner, and scrambled under. There he came upon a large, dark red ball that seemed to be alive. He happened to touch it with his feelers. And pop, as if by magic, out came hundreds of little lady-birds scurrying off in all directions.

Cheery Johnny turned quickly and dodged across the garden path, just as a number of little ant workers were bringing up some of the babies for a sun-bath.

Then up the fence post he went, where he almost ran over some of Mrs. Tussock Moth's funny little red-headed babies. Cheery Johnny waved his feelers as they marched past him like a little fashion parade, in their lovely suits of striped yellow and black.

Then down he darted again. But hardly had he reached the ground than a number of blue jays swooped down just before him, flapping their wings and calling, "Thief, thief, thief," in a most terrifying manner, as they scrambled around looking for a choice bit for breakfast.

Cheery Johnny stopped a moment, as if thinking what was best to do. Then he nodded his head as much as to say, "Finding your friends is a fine game to play. But right here and now, I can easily see, is no time and place for a cricket like me."

And in a wink he was out of sight under a friendly log.

Tommy Turtle was Smart

By GENEVRA A. COWAN

"A NICE pet," agreed Pat's Daddy as he examined the tramp turtle the little boy had brought home, "but a little . . . dumb . . . don't you think? Look at the old dry grass he eats!"

Although there was a twinkle in the man's eyes, Pat felt somehow that he should defend his little pet. But as he could think of no argument he trudged away with his pet and left his Father working among the rows of carrots, beets and radishes which he raised with pride.

But one day, the turtle's reputation was saved.

Pat and his Mother were going away for the day, so the little boy put Tommy under an old bushel basket and weighted it down with a flower pot. There was a hole in the basket through which he could push his head.

When they arrived home that evening, Pat's Daddy met them.

"Tommy Turtle upset the basket," he said, "and broke the flower pot."

"No!" exclaimed Pat.

"Yes," his Daddy replied. "Not only that but he sampled the tops of my vegetables very generously . . . seemed to enjoy their flavor."

Pat grinned. "Pretty smart, after all, isn't he, Daddy?"

Daddy grinned too. "Pretty smart," he agreed. "He knows prize vegetables when he tastes them!"

The Fireflies' Lanterns

By FLORENCE H. MOORE

The Fireflies hang their lanterns
Out in the "friendly dark,"
Like eager little travelers,
All ready for a lark.

Just how they make their light
No longer is in doubt;
Listen still a moment,
For now the secret's out.

Five years they grew in "Fox Fire,"*
Within some old, decaying log,
Absorbing phosphorescence,
To light up hill and bog.

For how could Gnomes and Fairies dance—
The Gray Owl take his flight?
How could the Bunnies frolic,
Without the Fireflies' light?

PUZZLE: Find the Fireflies' other friends, the Chipmunk and Wood Mouse

*Fox Fire is an illuminant found in decayed logs, which, after a certain period, is highly luminous, resembling phosphorescence.

Dale and His Butterflies

By JESSIE M. HARB

MANY children in northern Europe take great delight in the butterflies in spring, welcoming them by their common names, as we do the birds. I know a little boy of four years who, by being with his five older brothers as they have studied butterflies, has learned to recognize and name them as well as the older boys. When I showed him the issue of NATURE MAGAZINE having the double page of butterflies in black and white, he could name all but one—the wood-nymph. This one he had never seen.

Dale, for that is his name, likes to hunt for the monarch caterpillar that lives on the milkweed. He likes the striped coat of the caterpillar and the little "green and gold jewel box" he makes.

You know, the caterpillars that hatch from eggs that were laid on the milkweed are so tiny you can hardly see them, but they eat so fast and so much, and grow so rapidly that soon their coat becomes too small. The coat splits down the back and out he comes in a brand new one. This he does four times. The last time he has a pale green body with strips or bands of black and yellow. This is the time Dale likes to get them and put them into the box the older boys made to keep the caterpillars in. It is nothing more than a pasteboard box in which a square opening has been cut in the top or lid. Over this a piece of wire screening has been sewed. Each day he puts in fresh leaves from the milkweed.

By and by the caterpillar refuses to eat. In the box he fastens himself to the side or top by a tiny cone of web he has spun. Gradually his body changes. He is no longer a caterpillar but has become a long, round-shaped object about an inch long with a thin shell-like covering—"a green house with golden nails." In this he lives two weeks and a day. However, that sometimes varies. Shortly before the butterfly comes out, the little "green house" becomes grayish and transparent so that you can see the colors and markings of the butterfly's wings. Soon the shell splits open and the butterfly slowly crawls forth.

As Dale studies the butterfly in his hand, he is thinking of the caterpillar that he put in his box and can hardly believe this beautiful butterfly was once a crawling caterpillar.

Fairies in My Garden

By WINELLA W. BURDETT

In my garden fairies dwell,
Hiding in each leafy dell,
Nodding from the violets blue,
Dancing in the meadow rue,
Sending forth a fragrance rare
From the lilies tall and fair,
Listening to the bluebells gay
As they ring a fairy lay;
Climbing up delphiniums tall,
Tossing pollen like a ball,
Playing pranks among the vines,
Swinging in the columbines;
Dreaming of the roses red,
Sleeping in the poppy bed,
Bathing in the morning dew
That sparkles with a rainbow hue;
Brushing cobwebs from the grass,
Tripping lightly as they pass,
Waking birds among the trees,
Sipping honey with the bees;
Basking in the sunlight warm,
Sporting on the shady lawn;
Happy fairies work and play
In my garden every day.

Careless Camping Evils

Careless campers have created an acute problem in wilderness tracts within fifty miles of New York City. The Palisades Interstate Park has been obliged to enforce its rule about making fires only at designated places.

The Sterling Mine and Railway Company has threatened to close its vast acreage to Appalachian Trail users. It allowed the A-T to be routed over its lands, west from Arden, on condition that hikers and campers kept to the footpath. One violator, caught trespassing on the shores of a forbidden lake, remonstrated with the guard about his rights. Hikers and campers have only restricted privileges on private property.

The gateway to majestic Mount Torne is owned by the Ramapo Land Company, which naturally frowns upon fire hazards created by unregulated camping. Entrance is now obtained by well-behaved club groups only on permit.

Terrace Pond, wilderness mecca of hikers and campers, was enjoyed by the hardy minority for years. It took expert woodcraft knowledge to find the small lake, cleverly concealed in a complicated network of rugged ridges and dense woodlands. Crude trails began to appear when its fame spread. The pioneers resented the intrusion of the mob, particularly the rowdy element.

The New Jersey Zinc Company, owners of the tract for lumbering of mine props, recently discovered no fewer than sixteen camp-sites surrounding the pond instead of the original two. The fire hazard could not be ignored. They proposed closing the tract to trespassers, so twelve of the pioneers intervened and leased ninety acres around Terrace Pond, and agreed to patrol it. The leaseholders are allowed but twenty-five guests on any one day, so permits are now sparingly given.

As we see it, the hiking and camping majority must suffer because of the offending minority. Eventually most private tracts will be closed to all but reputable club groups. It will then be easy to centralize the responsibility. This has already happened in the Canadian Pacific west, where members of the British Columbia Mountaineering Club are granted individual permits to enter the Vancouver watershed area, ordinarily barred to trampers. The club accepts full responsibility for the actions of its members there on private trips.

A Staggered Hike

A one-day event adapted to the personal preferences of Cleveland Hiking Club members commenced at 3:30 a.m., with a Sunrise Hike of five miles to the highest point in Independence, Ohio. At 7:45 a.m., and 1:45 p.m., they were joined by later groups at agreed-upon points. Those who took the entire hike did seventeen miles in all. Each group had its own leader.

Aiding Guest Hikers

A Glad Hand Committee has been appointed by the Minneapolis Municipal Hiking Club to break the social ice when new guests are present. To insure guests being properly clad on their first hikes, the Interstate Hiking Club of N. J.-N. Y. has prepared a mimeographed *Trail Clothing and Equipment Bulletin.*

Hiking and Camping Forum

Conducted by
Ernest A. Dench

Inquiries concerning the fields embraced by this department will be answered by mail if a stamped addressed envelope is enclosed. Address the department editor.

Questions and Answers

Question: There is only one hiking club in my city, and easy five-mile Sunday afternoon jaunts are taken. Several friends and I would prefer an all-day hike of from eight to twelve miles. We have refrained from making overtures to the club for this reason. C. M. C.

Answer: There is an obvious need for another local club. Write a letter for publication in your daily newspaper. Describe the kind of hikes you would like to take, and invite those with like preferences to communicate with you. Start a club as the outcome. To interest other congenial people follow it up with weekly notices of your trips. This department editor is actively connected with a model small hiking club and he is sending you a copy of their booklet, which will give you valuable pointers.

Question: I dislike toting a heavy pack on the trail during an overnight camping trip. What would you suggest? Miss E. S.

Answer: Select an ideal camping base, one where good one-day trips can be taken in all directions. Perhaps the car can be driven close to the camp, in which case you can take complete equipment for your comfort. If you have a friend or two, not hikers, who might like to camp out all the time, they can act as caretakers in your absence.

Guide Published

The latest Appalachian Trail Guide Book covers the ground from the Housatonic River in Connecticut to the Susquehanna River in Pennsylvania. Unquestionably more hikers and campers frequent parts of this region than any other, because of its accessibility to the populous centers. This well-written and up-to-the-minute book, edited by Raymond H. Torrey, contains eleven sectional maps. It may be secured, for fifty cents, from the New York-New Jersey Trail Conference, 99-28, 193rd Street, Hollis, N. Y.

"Leaded" Boots

The department editor spotted, in a catalog, a pair of hiking boots weighing nine and three-quarter pounds! Goodness gracious, what tonnage to lift up a mountain slope! His curiosity aroused, he queried the company, which apologized for the misprint. The actual weight was three and three-quarter pounds.

College Week Outing

The Intercollegiate Outing Club Associ tion holds its third annual College We September 8 to 15 in the Presidential ran of the White Mountains. The Great Gu Shelter of the A.M.C., will be used as hea quarters. The I. O. C. A. was formed Ma 1932, with seven affiliated clubs. The nun ber has since increased to twenty-three clubs with Eastern ones dominating. Hiking ranks first in the varied activities of I. O. C. A clubs.

Baby Hikers

The youngest guests to participate in hik of the Contra Costa Hills Club are twi babies, born November, 1933. Their fon parents, Paul and Pauline Stark, have im provised special knapsacks for transportin their precious offsprings over the trails. *Th Knapsack,* newspaper of this Oakland, Cal club, observes that—"To those who groa under the weight of a light lunch, a wris watch and carfare home, the enthusiasm an endurance of the Stark family are beyon comprehension."

Thirst-Quenching Quest

Strips of the old Oregon Trail of cov ered wagon days still remain in Nebraska A hidden gold legend cannot be eradicate despite the many disappointing searches When the Omaha and Hastings Walking Clubs recently held a joint hike, the partici pants scoured the countryside for edible treasure. Clues were furnished, the quest leading to a cache near a lone tree facing ravine. The metal container was dug up and opened. Yes, the lemon drops passed around by the discoverer were relished on this hot day.

Utah Hospitality

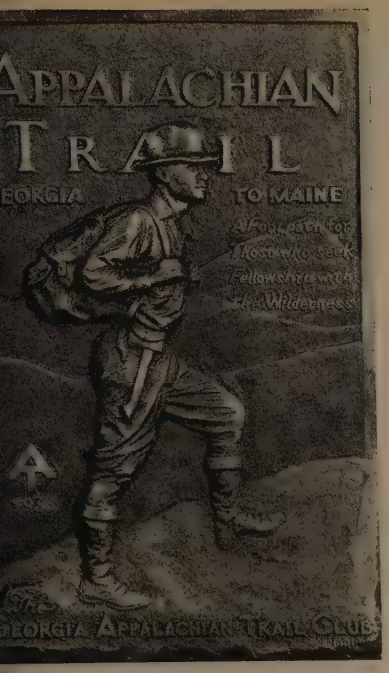
The Wasatch Mountain Club extends liberal guest privileges to members of other clubs visiting Salt Lake City. The W. M. C. offers a varied program of hiking, skiing (in season) and social events. Registration headquarters are at 155 South Main Street, Salt Lake City. Here the club's eleven directors can be contacted.

White Mountain Guide

The ninth edition of the A. M. C. *White Mountain Guide* is now ready. The maps have been brought up to date and more handily grouped in the book. Winter sport enthusiasts will welcome details of the new ski trails, and likewise the chapter on climbing Mount Washington in winter. As another edition will not appear for three years, the reader will get long service out of the guide, which costs $2.65 from the Appalachian Mountain Club, 5 Joy Street, Boston, Mass.

Club Camp Popular

No hikes were scheduled by the Omaha Walking Club during July and August. Picnic get-togethers, a month apart, replaced them. "The Shack," O.W.C. camp, was also open for weekend or Sunday outings. Qualified members took turns at being host or hostess on Sundays, or chaperoning over weekends.



Bronze Tablets on A-T

The most elaborate type of marker adorns Appalachian Trail sector maintained by Georgia Appalachian Trail Club. This nze tablet, 12 by 18 inches, is erected on arge stone base at each place where the T is crossed by a highway. The marker s modelled by a club member—Dr. G. H. ble, an Atlanta physician whose hobby nodelling. The hiker figure that dominates design is based on a photograph of a ow member. "A Footpath for Those who k Fellowship with the Wilderness," is the propriate designation applied to the A-T this tablet.

According to President Warner W. Hall the G. A. T. C., the tablet has increased trail's prestige in Georgia. People who d not previously heard of the trail are in- iring about it. Local forest and park thorities, formerly inclined to regard hik- ; club activities as rather juvenile, obtain desired information as to why this master il deserves such an elaborate indicator. e G. A. T. C. believes it pays to gain ious recognition for the A-T whenever d building or some other form of trail croachment is launched by local authori- s.

With certain changes, the master pat- n of the tablet can be adapted to stock ter mounting. Any other A-T club inter- ed in having copies inexpensively made their own requirements should com- unicate with Warner W. Hall, Box I, ecatur, Ga.

A Highway Compromise

The Sixth Annual Appalachian Trail Con- rence recently took place at Long Trail dge, Sherburne Pass, Vermont. The Green ountain Club acted as hosts. The auto- obile highway menace was vigorously dis- ssed, and Benton MacKaye offered, as a mpromise, a "flankline" or valley plan. his would largely insure hikers the isola- on of their beloved "tops" or skyline. Mac- aye contributes a full outline of his com- on sense scheme to the current issue of *ppalachia*, obtainable at seventy-five cents om the Appalachian Mountain Club, 5 Joy reet, Boston, Mass.

Hot Weather Headgear

The hiker or camper whose neck is a perpetual shower on a humid day should find a new type of perforated cap to his liking. It is of a strong but flexible straw braid, and will withstand crushing. This department tested it out this summer, when it prevented top of the head perspiration. The hair, usually dripping wet, was dry. The area not covered by the cap—lower neck and forehead—perspiringly functioned as of yore. In other words, it reduces the number of perspirational outlets. Absence of rain when the cap has been worn compelled the editor to place it under the bathroom shower. The cap revived after being dried out in the sun. Two Eastern firms are now manufacturing this inexpensive cap.

Nature Trail Upkeep

Denver's Nature Trail on Lookout Mountain is the exclusive responsibility of the Colorado Mountain Club's Junior Group. It entails constant attention, as both harsh weather and souvenir collectors combine to diminish the many identification tags dotting the path. The Junior Group is also busy on a scrapbook of club mementos.

Maine A-T Progress

Four members of the Bates College Outing Club, Lewiston, Me., recently returned from a week's scouting expedition. One of the last uncompleted Maine links in the A-T, forty miles between Rangeley Saddleback Mountain and Grafton Notch, has now been satisfactorily surveyed. The scouted route requires little trail cutting, despite its wilderness character. The party was in charge of Professor William H. Sawyer, Jr.

Advice to Camp Novices

Campcraft Manual is a pamphlet recommended to camping novices. After becoming conversant with the fundamentals set forth by Frances T. Horak, a bibliography is provided for their later reading guidance. The "Map Making" chapter will profit seasoned hikers and campers. Map making is an art, and most users of the outdoors rely on ready-made maps. Often a large scale map of a local wilderness tract does not exist. The few who are well acquainted with the terrain are unable to pass along the information, gathered over a period of years, to their friends. The pamphlet costs fifty cents from G. C. Manthorne and Company.

Housewives Take Trail

A housewives' hiking group is a departmental innovation of the Women's Athletic Club, Glendale, Cal. Every Thursday morning a fair percentage of the forty members meet in their cars at a central starting point. Cars are parked where the circular hike begins. They return in the late afternoon, after having covered, at any easy gait, from seven to nine miles on mountain trails. Once in a while, to please those who relish stiff tramps, a fifteen-mile trip is included. The membership ranges from young brides to grandmothers. The member hiking the greatest number of miles during the club year receives a suitable trophy.

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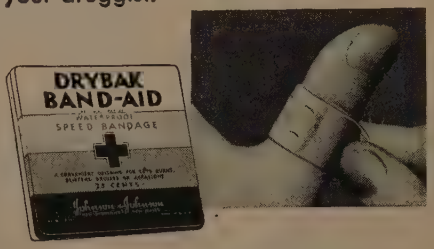

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Editor, NATURE MAGAZINE:

I earnestly urge a campaign against B. B. guns.

Boys have these guns and go out in the fields and shoot down innocent little song birds ruthlessly. They do not think of the little birds starving to death in the nest, but they think it a fine sight to see a catbird flutter from its perch and fall helpless in the grass only to become the innocent victim of a group of boys who kill the birds.

The teacher that I had said that the world would be overrun by insects unless we helped to protect the birds.

One excuse for killing birds such as the crow, the sparrow and bluejay is that the boys say that these birds are robbers of other birds' nests and that to protect the other birds they should kill these birds. What if they do rob other birds' nests, that is the birds' fight, not theirs. I have buried about six birds that were killed by the B. B. guns. It is a pitiful sight to see a catbird sitting on the branch of a tree joyfully singing, when a boy sees it, shoulders the gun and the bird flutters pitifully into the grass below.

I think that some protection should be given these birds or before long these boys' sons will not be enjoying the sweet song birds.

Yours truly
KENYON WEBSTER.

Far and Wide

Editor of NATURE MAGAZINE:

The other day there came to my attention an incident I pass on in the belief it may interest you. It concerns the article I wrote for you several months ago about Chico, the tiny monkey brought to this country from South America by Colonel Victor Ruehl.

Colonel Ruehl, who is now in Guatemala on government business, was introduced recently to the Chinese consul-general to Guatemala. The Chinese official had heard of the colonel but could not, for the moment, remember in what connection. They compared notes on China, a country Col. Ruehl had visited, but the answer was not there. Then the Oriental remembered.

"Have you a son who has a tiny monkey for a pet?" he inquired. "Then that is it; I read all about them in NATURE MAGAZINE while in Peking."

You seem to have quite an extensive and varied following.

LEWIS T. BOLGER

(Like a fountain pen, or was it somebody's paint, Mr. Bolger, we encircle the world. Ed.)

New Chicago Zoo

A distinguished addition to the number of zoological gardens was made when the Chicago Zoological Gardens were dedicated on June 30. Backed by the Chicago Zoological Society, of which Mr. John T. McCutcheon is president, the new zoo has the largest area of any such institution in the world. It has been planned along the most modern lines of zoo management with natural habitats and bars and cages eliminated. A considerable and varied collection is already installed and will be added to as time and available specimens permit.

COVER COMMENTS

With our change in cover with the August issue we invited comments from our readers. We have received them, and while they have been both pro and con, they all testify to an active interest in the magazine. Here are how some of our readers feel.

"I think the new type of cover for NATURE MAGAZINE a great improvement. Although the colored ones were attractive and often exceptionally beautiful, I do feel that a standardized cover of the August number type lends more dignity to the magazine, in addition to making it more up-to-date. It puts NATURE MAGAZINE in the class of the better magazines which all have such covers." I. E. W., Newburgh, N. Y.

"May I add a word of approval for the more sturdy cover on NATURE MAGAZINE? My copies have not worn well although they are handled by adults only. I am sure that the new cover will prove to be more durable." S. G. S., Fayetteville, Ark.

"Subject—'The Change in Cover.' Replying to yours on Page 79, August issue. Bluntly and briefly, any five cent magazine of the most inferior type presents a better appearance than does this issue. You have materially lessened its attractiveness—looks like it was controlled by ⅔ Irishman and ⅓ Orangeman. Then that circle—'To Stimulate Public Interest in Nature'—God forbid that anything in Nature could be comparable to this. The only thing it could stimulate, so far as I am concerned, is nausea." F. A. B., East Williston, N. Y.

"We believe the cover is very attractive, dignified and serviceable. If it allows a saving of funds which may be used 'inside' the move is certainly justified, as that is the part which is permanently valuable. Congratulations on a more sober cover!" A. K. S., Jr., Mohonk Lake, N. Y.

"I think that the colored covers have been unusually fine and very worth while in spite of any necessary defacement by printing. There are enough somber things in this depressed world, and Nature pictures have been colorful and cheery through the past months." M. G. C., Binghamton, N. Y.

"We will miss, very much, the pictures on your covers of NATURE MAGAZINE as we made the best collection of Nature pictures that we ever saw from them." H. J. C., Laconia, N. H.

"Not long ago, in looking through some of my old numbers of NATURE MAGAZINE for a simple lesson on insects for Girl Scouts, I wished, then, that the magazine still had the dignified covers of brown, instead of the highly colored ones I was getting and which I thought cheapened the magazine. When the August number came it seemed my wish might come true." A. L. W., Mooresville, Indiana.

"While I realize that a pretty face does not necessarily mean a likable character, nevertheless your former covers were of such nature that it made a very pleasing and inviting magazine to leave upon one's reading table." S. H. B., Portland, Oregon.

"The present cover, while more durable, is not distinctive. It places NATURE MAGAZINE in the same class with the popular literary, historical and current events magazines on our news stands. I am not dissatisfied, but I would like to see the durability of the present issue combined with the attractiveness of former covers." D. R. H., Harrisonburg, Va.

"The change in the cover page seems to me to be good. I hope that it will be retained." C. C. C., Knoxville, Tennessee.

Photomicrographic Outfit

The amateur who has been hampered by inadequate or too expensive equipment in venturing on this fascinating phase of nature croscopy is now offered a complete photomicrographic outfit at modest cost.

Bausch & Lomb has designed a new microscope of bakelite and chromium with the curved arm typical of instruments used in laboratory work. It may be used both as a micro-projector and for photomicrography. Exceptionally high power of resolution yields images to be expected only in far costlier instruments. Two objectives accompany the instrument, giving magnifications of 75 to 300 diameters, although much lower magnifications are more common and desirable.

A complete instruction booklet, written especially for the amateur, explains in detail how to prepare slides of interesting subjects, living or dead. The variety of life in small pools and puddles and in the insect and plant world are endless. This is also true of household objects, such as salt, sugar, spices and bits of fabric. Photomicrography enables the amateur to advance his hobby by making a permanent record of his work in an easy and inexpensive way. It also teaches the important factors in illumination for this form of photography and increases the knowledge of filters, films and the result of exposures and magnification.

Robin Robbery

"Two or three weeks ago my daughter Mary Ann, aged thirteen, bought herself a pair of those white cotton gloves with fancy tops girls are now wearing. She was very proud of them," writes Judge Louis Lightner of Columbus, Nebraska. "She washed them and hung them on the clothes line. They disappeared. A few days later we found one of them lying on the roof of the garage and thought the boys in the neighborhood had played a joke on her. In the meantime her mother was complaining because Mary Ann had lost several brassieres. A couple of days age we were rearranging the yard in preparation for an ice cream social to be given that evening by the Girl Scouts, and, happening to glance up, I saw something white. Further examination disclosed the missing glove and several brassieres all appropriated by mother robin, who sat contentedly in her nest surrounded by this feminine finery."

A Naturalist Prowls

Miss Frances Pitt is a widely known British Nature writer and photographer, a competent naturalist and the author of an imposing list of Nature books. To these she has recently added *The Naturalist on the Prowl*, a fascinating collection of stories of the wanderings of a Nature lover in the by-ways. It is illustrated by some of her splendid pictures and published by the Macmillan Company, selling for two dollars.

Appointment Made

Dr. Eric Ponder, professor of General Physiology at New York University, and formerly of Edinburgh, has been appointed investigator in General Physiology at the Biological Laboratory of the Long Island Biological Association at Cold Spring Harbor, New York.

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Honeybee Wild as Ever

The honeybee is often spoken of as domesticated, but this is far from true. Although men and bees have been closely associated since the dawn of history, the honeybee is apparently as wild today as it was centuries ago.

Other wild animals have yielded to man's influence and many of them are now as dependent upon man as man is upon them; but the bees in apiaries are as wild as are their cousins in dense forests.

Bees taken from a bee tree and placed in a modern hive are as much at home there as though they were descended from generations of hive-raised bees. On the other hand, a swarm that has left a modern apiary and settled in a hollow tree fares as well in its new environment as did any of its ancestors in cave or forest. Bees are no more domesticated than are the bats in the barn or attic.

Bee specialists of the United States Department of Agriculture explain this unchanging trait in bees by stating that the queen and the drone that mates with her—the only bees having the power of reproduction—have no contact with the outside world and therefore have no new experiences to pass along to their offspring. The worker bees, who are constantly subject to new conditions, have no offspring and no opportunity to pass on to future generations the benefits of their experiences.

Man has been able to control the mating of most plants and animals, but with bees this is impossible because the queen mates only on the wing, while high in the air. Attempts to control mating by confining queens and drones in hives or even in large greenhouses have failed.

In recent years bee specialists in the Department of Agriculture have been able to impregnate queen bees by the use of delicate instruments. It is expected that by this method of artificial insemination changes can be brought about in honeybees that will render them still more useful to man. Although bees have not been tamed, the modern beekeeper has adapted their activity to human needs by placing their hives where honey plants abound.

Frog Music Charms

Here is a story that comes from the New Jersey State Department of Conservation and Development, and, directly, from the C.C.C. camp in the Penn State Forest near Chatsworth, New Jersey. Company foreman Cecil C. V. Evers is naturalistically-minded and maintains a den of snakes, the recent monarch of which has been a huge pine snake with a testy temper.

When Evers made the discovery that frogs were abundant in the swamps of Penn State Forest, he decided to treat his reptiles to a change of diet, and procured a mess of the green batrachians. These he dumped into the den, having first installed a deep pan of water in order that the refreshments might feel at home while awaiting consumption.

Suddenly a frog disappeared from the pan, and a lump was observed half way down the length of a blacksnake. Then other disappearances followed. All was working out according to expectations. The diminishing family of frogs clung to the edge of the pan, too deeply submerged to sing—too plucky

Early Birds in the Rock Garden

Lovely Grape Hyacinths

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Grape Hyacinths *{Armeniacum}*. Fragrant cobalt blue. **60c per dozen; $4.00 per 100.**
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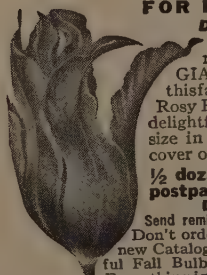

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A. B. Katkamier, Macedon, N. Y.

Between the Season Cruises

Courtesy Cunard Line

THE cruise habit has firmly fastened itself upon the traveling public. In the winter the trend has been to the warmer climates of the West Indies and South America. In the summer the exodus is towards the North Cape, Labrador, Newfoundland. In between the seasons the movement may be in any direction—North, East or South.

The steamship companies offer a particularly attractive group of cruises in the month of September. For the convenience of our readers, we are listing certain interesting cruises. If you are interested in additional details, check the coupon and mail in to the Travel Bureau.

	Date September	Days	Places Visited	Minimum Rate
A.	1	13	Canadian North Cape, Bermuda	$115.00
B.	7	3¼	Yarmouth, St. John	27.50
C.	8	13	Trinidad, La Guayra, Curacao, Colon, Havana	135.00
D.	9	6	Nassau	50.00
E.	16	12½	West Indies & South America	115.00
F.	17	4	Halifax	40.00
G.	Thursdays	4	Charleston, S. C.	35.00
H.	Wednesdays & Fridays	6	Savannah	43.00
I.	Tuesdays	13	La Ceiba	90.00
J.	Saturdays	11	Jamaica	110.00
K.	Monthly	24	Leeward & Windward Islands	150.00
L.	Daily	4	Norfolk & Virginia Beach	27.25

* * *

All information concerning steamship sailings, train connections, travel rates will be supplied by the Travel Bureau of Nature Magazine, a service for the convenience of all readers. Literature on specific countries, sections, cruises and tours will be gladly sent and we suggest that you fill in the coupon below which is provided for your convenience. The following countries and territories may suggest a trip to interest you:

1. England	9. Egypt	17. West Indies	25. Maine
2. France	10. Russia	18. Holy Land	26. Glacier Park
3. Italy	11. Spain	19. Mexico	27. Yellowstone
4. Germany	12. India	20. South America	28. Grand Canyon
5. Switzerland	13. China	21. Bermuda	29. Jasper Park
6. Holland	14. Japan	22. Hawaii	30. Yosemite
7. Sweden	15. Australia	23. California	31. Banff & Lake Louise
8. Norway	16. Africa	24. New England	32. New York City

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to croak.

Finally—probably as a gesture of her defiance—one of the larger frogs climbed on the nose of a clinging brother and sour ed his familiar dirge. Nothing untowa greeted this beginning, and the singer to heart and plunged into the livelier anthe of the bogs. Then, suddenly, up rose t head of the pine snake. Peering, appraisin the head inched forward until it sway ominously above the pan. The frog sang defiantly, as if he had made up his mi to go down with a song on his lips.

At last the terrible head began to witi draw, and at the same time a sinuous, bron coil heaved up from the tangle of serpen and descended gently across the pan of wate The taut body relaxed until it lay submerge And then the pine snake hissed a clea jungle note—plaintive and assuring. At on the frogs cocked their heads, their dull ey brightening. And in a moment they had a climbed aboard the pine snake that ha fallen into their pan, and stretched the cramped legs, and attuned their voices their leader's pean of delight.

And, now, morning and evening, th pine snake heaves twelve inches of his re section into the water, and the frogs sit c it and warble. Their number has remaine undiminished for ten happy days. The ma ter of foodstuff has become a minor inte est to the snakes. Music hath charms.

About Birdland

Much imagination and ingenuity is dis played by the youngsters of the sixth gra of the Holcombe Street School, Hartfor Connecticut, in writing and editing *TH Winged Journal*. It comes from "Chirpvill Birdland" and contains a variety of interes ing and amusing notes about happenings i that avian country. There are even depar ments on the theater and sports, all inspire by bird study, and while the notes are fanc ful they all have a background of bir knowledge and appreciation. Young M Leonard Rosenthal was the editor-in-chie

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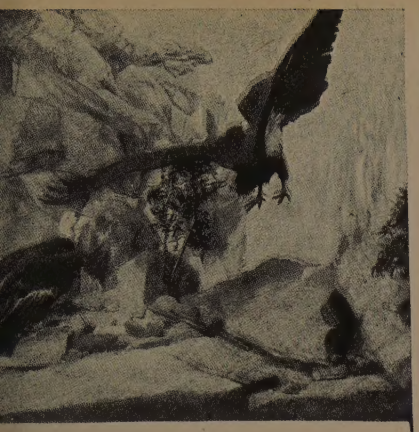
Tree Conference

The Tenth Annual National Shade Tre Conference is being held at Carnegie In stitute, Pittsburgh, on August 30 and 31 The National Arborists Association will hol a meeting there on the afternoon of Augus 29, and the American Society of Arborist will hold their annual meeting that evening The committee in charge has arranged nu merous educational exhibits of tree insect and diseases, including the Dutch elm dis ease. The public is invited to attend th meetings.

Nooz of the Zoo

Well calculated to be interesting and t stimulate interest in the San Diego, Cali fornia, Zoological Garden is *Zoonooz*, offi cial organ of that institution. It made it bow the first of the year under the editor ship of Belle J. Benchley, aided by a com petent staff. It is distributed free to member of the Zoological Society and sold otherwis at one dollar a year. It provides a means fo telling of the interesting events constantl taking place in the Zoo. May it succeed be yond all hopes.



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Mineral Collecting

Peter Zodac is the editor of the Magazine, *Rocks and Minerals*, and he has now written an eighty-page booklet entitled *How to Collect Minerals*. It is precisely what its title indicates and is a complete, simple and practical work for anyone interested. Many collections of this sort are likely to suffer because the collector has given little thought to his plan and has gathered in a haphazard way. This booklet would correct that and enable the collector, young or old, to make his activity worthwhile and interesting. The brochure is available from Rocks and Minerals, Peekskill, New York, at one dollar a copy.

Saving Ground Birds

Every year many game and song birds who nest on the ground in fields supporting wheat or forage crops are destroyed by mowing machines. Mother birds sitting on eggs, or having the responsibility of young in the process of hatching, stay on the nests and are killed by the cutter bar of the mower. In 1931 the Peterson flushing bar (also called the Wisconsin bar) was devised to flush birds from the nests and thus give the mower a chance to stop, discover the nest and leave an island of hay or other crop around the nest site. This bar has not proved generally successful, and was not adapted to use in Michigan. Dr. P. F. English of the State Department of Conservation, however, has conducted experiments and surveys and devised a flushing bar which has been most successfully used. It consists of a bamboo pole held horizontally at right angles in front of the tongue of the mower. To the free end are attached short pieces of chain which drag through the hay several feet ahead of the cutter bar and this combination seems to flush the majority of birds. The installation of this device costs less than two dollars and the saving of birds incalculable.

Snails and Snakes

By Dr. J. E. McIntosh

Last year, I found three dead garter snakes in our pool. I could not understand the whys and wherefores of this unusual condition and it caused me to look for snakes every time that I went near the pool. One day, I saw a live one in the water and he seemed angry or in distress for he was flopping and slapping his tail and wrapping it around the stems of the pond lilies. I took a stick and touched his tail. He, immediately, wrapped around that and I pulled him out. To the tip of his nose was attached a small snail. I laid them on the ground and watched this struggle between two animals where size did not seem to count for much in the last battle. The snake would twist the large part of his body around the snail and tighten down as if to snap him off, but when he got about so far it seemed to hurt his nose and he would allow his body to slide over the snail, only to go through the same performance again.

This year, I was looking for these encounters and I saw plenty of them. I got two at one time, and one of the garter snakes was large for his kind but the snail attached to the end of his nose was no larger than a

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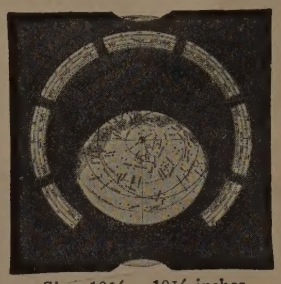

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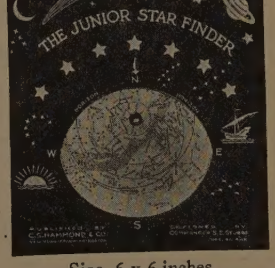

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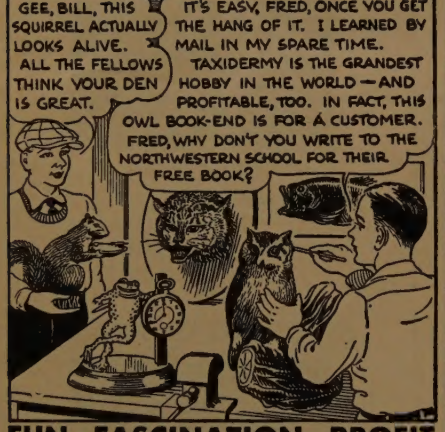
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fifty cent piece, shell and all. He was bringing his victim to the last throes of life as they all seemed to do before they let go. Evidently, the snakes were bent on having seafood for their dinner but they paid dearly for their choice of diet.

Enjoying England

Much of the travel literature issued by the thousands of tons annually is beautifully printed and, of course, calculated to sell the idea of immediately rushing to the office of the ticket agent. Much of it defeats the aims of its lavish beauty and expense by extravagance of claim and propensity for superlatives. Now and then some of it is downright dishonest and does more harm than good by painting a picture that no traveller can hope to find materialized in fact. In our humble estimation a lot of these high-powered fabricators of travel literature can learn a lesson from an unpretentious, honestly-written, factually-illustrated little booklet entitled *You'll Enjoy England* and brought out by the Associated British Railways. This company found an American who enjoyed England—not a difficult task, to be sure—and who could write nicely but not extravagantly about his enjoyment. Judging by the result it might be well to round up a few Spaniards, Italians, Norwegians or Bolivians who found the Grand Canyon, Glacier Park, Lake Louise or the Great Smokies something worth seeing and let them do a little writing of travel literature. At least they would have seen what they are writing about, which, we suspect, is more than some authors of travel brochures have done.

A Lesson Learned

In Los Angeles, according to the *Times*, of that city, the portals to the Curb Exchange are guarded by Albert Von Ravensberg, who, as a young man, spent years in the British Guiana jungles in the service of the British Government. He says that one day he shot at a monkey in a tree and when he rushed up to the stricken animal he found it was a mother with a baby. She held the little monkey out to him. "As I took the little monkey from her," says Ravensberg, "she seemed to look at me and say, 'Here, you murderer, take my baby and look after her.' I made up my mind then never to shoot another living creature." He kept the monkey two years until finally the jungle urge called it back to its own.

Effective with the November issue of Nature Magazine a department entitled "Photographic Notes" and devoted exclusively to photography from the Nature point of view will be conducted by Mr. Samuel Brown. In advance he will welcome any questions or suggestions which will be answered through this department.

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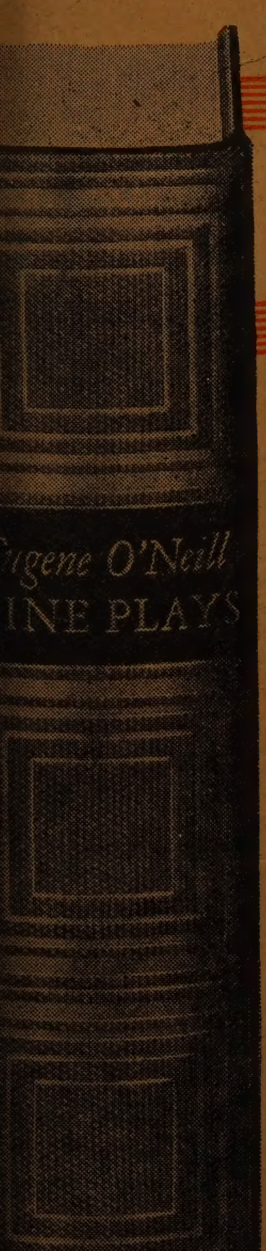

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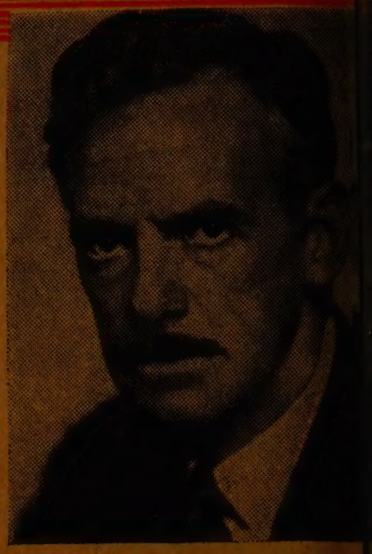

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